The Impact of a Child with Down Syndrome

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Abstract

We characterize the causal impact of having a child with Down syndrome relative to having one without Down syndrome using event studies around birth and population-wide Swedish administrative data from 1990 to 2019. The incremental effect of having a child with Down syndrome is to reduce the likelihood of subsequent parental separation and increase subsequent child-bearing. It also increases total income due to the presence of a generous child allowance for families with disabled children. These effects exist both in an environment with essentially no prenatal testing – where the birth of a child with Down syndrome is random conditional on maternal age – as well as once prenatal screening and testing is more common. In contrast, the impact on labor earnings varies. In the "no testing" environment, having a child with Down syndrome leads to a 30% greater decrease in maternal earnings relative to having a child without Down syndrome, but this effect reverses once testing is available. Our results speak to the impact on families of a child with Down syndrome in a setting where families are largely insured against any additional financial costs.

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1 Introduction

The rapid development of health technologies that assess the risk of chromosomal abnormalities in a fetus are at the center of many demographic, policy, and ethical debates. By allowing parents to act on their preferences over their potential children's genetic characteristics, these technologies have spurred concerns over "designer babies" and have been hypothesized to be eradicating certain traits in the population (Zhang 2020). Health policies that influence the affordability of these technologies can influence their utilization and hence the prevalence of births with chromosomal abnormalities (Conner et al. 2025).

Despite these debates, we have relatively little direct empirical evidence about the impact on parents of having a child with chromosomal abnormalities. We focus on Down syndrome (Trisomy 21), which causes mental retardation and structural deformations, and is the most common chromosomal abnormality in viable pregnancies. An overwhelming majority of pregnancies that are prenatally diagnosed with Down syndrome are terminated (Conner et al. 2012; Zhang 2020), which seems to suggest that individuals carrying such a pregnancy may expect the arrival of a child with Down syndrome to negatively affect their lives.[1] Consistent with this view, when we surveyed over 100 experts in early 2025 about the likely impacts of an unexpected arrival of a child with Down syndrome relative to one without Down syndrome, respondents predicted that the arrival of a child with Down syndrome would raise the likelihood of divorce and reduce subsequent fertility.[2] On the other hand, survey evidence from Canada and South Korea document a positive correlation between the presence of a Down syndrome child and parental statements that their child is easy to raise (Marcovitch et al. 1987) and that they receive support from their communities (Erickson and Upshur 1989), respectively; furthermore, in a survey of parents in the United States, intended to provide information to be shared with expectant couples who receive prenatal counseling, about four-fifths of parents who have a child with Down syndrome state that their outlook on life is more positive because of the Down-syndrome child (Brian G Skotko, Susan P Levine, and Richard Goldstein 2011).[3]

[1] Of course there are other possible interpretations. For example, expecting individuals may anticipate that the unborn child would lead an unhappy life, and thus act in accordance with altruism.

[2] Specifically, 65% of respondents predicted that the divorce rate would increase, 14% that it would decrease, and the remainder predicted no impact; thus among respondents who predicted that the divorce rate would be affected, four times as many respondents predicted an increase than a decrease. For subsequent fertility, 68% predicted a decrease, 20% an increase, and the remainder predicted no impact. Appendix A provides more detail on the survey and its results.

[3] In addition, 97% say that they are proud of their child, and 95% that the siblings without Down syndrome have a good relationships with the Down-syndrome sibling. For more in-depth anecdotal evidence on the experience of having a child with Down syndrome, see Bérubé (1998); Beck (1999); Kidder and Skotko (2001); Cohen, Nadel, and Madnick (2002); Zuckoff (2002); Soper (2007); Groneberg (2008); and Soper (2009). Further, Urbano and Hodapp (2007) documents a negative correlation between the presence

In this paper, we provide more direct empirical evidence on this topic by estimating the causal impact of having a child with Down syndrome relative to one without Down Syndrome. We do this for a broad swath of family outcomes, including parental relationship stability, subsequent child-bearing, parental earnings and income, and mental health. To do so, we overcome two key challenges. The first pertains to data; we leverage unique administrative data from Sweden that allows us to observe the universe of children born between 1991 through 2018 as well as whether or not they have Down syndrome, to link these children to their parents, and to trace many dimensions of the parents' lives and well-being over subsequent years. In the spirit of Kleven, Landais, and Søgaard (2021), who compare changes in parental outcomes following the birth of a biological child and an adopted child, we use these data to compare changes in parental outcomes following the birth of a child with and without Down syndrome.

The second challenge is that mothers who give birth to children with Down syndrome tend to be older and have different socioeconomic status than mothers who give birth to children without Down syndrome (Stoneman 2007; Corrice and Glidden 2009; Hunter et al. 2013); this complicates the interpretation of simple comparisons of families with and without Down-syndrome children (see, e.g., Urbano and Hodapp 2007). To address this, our empirical strategy exploits the fact that – in the absence of prenatal testing – the occurrence of Down syndrome in a fetus is as good as random, conditional on maternal age (Sherman et al. 2007; Oster and Fox 2024). Specifically, our primary analysis focuses on births to mothers aged 34 or younger that occurred prior to 2005, which is an environment where prenatal testing is essentially non-existent. As we discuss in more detail below, during this time period non-invasive prenatal testing was not yet available in our empirical setting and invasive testing (which carries a miscarriage risk) was very rarely used among women younger than 35, whose pregnancies have a relatively low risk of Down syndrome.

In this sample, we observe approximately 1,000 births with Down syndrome and over 1 million without Down syndrome. The rate of invasive testing is very close to zero (less than 1% of births) and, consistent with Down syndrome being randomly assigned conditional on maternal age, a wide range of pre-pregnancy maternal characteristics are similar among mothers of the same age who give birth to a child with and without Down syndrome. Our estimates therefore reveal the population average effect of unexpectedly have a child with Down syndrome relative to having a child without Down syndrome.

Since the early 2000s, however, the rapid development of non-invasive prenatal screening technologies have reshaped expecting individuals' ability to obtain information about the health of the fetus without undergoing an invasive procedure – and, thus, without any risk of

of a Down syndrome child and parental divorce in data from the state of Tennessee.

miscarriage. In Sweden, various regions introduced coverage for non-invasive screening starting in 2005.[4] Affordable and widely available prenatal screening introduces the possibility of selection; thus, the results from our no-testing environment may be less applicable in more recent years. We therefore also report results for births after 2005, in which 44% of mothers experience some prenatal screening or testing; we refer to this as the prevalent-testing environment. In this sample, we observe approximately 1,200 births with Down syndrome and about 1.3 million births without Down syndrome. Here, pre-pregnancy maternal characteristics look different even conditional on age; mothers who give birth to a child with Down syndrome tend to have lower earnings and income, are more likely to be married to the child's father, and are less likely to have a college degree. Our estimates in this setting therefore recover the impact of having a child with Down syndrome on the (likely) selected set of parents who choose to forgo prenatal testing or to not terminate the pregnancy if the test reveals Down syndrome.[5]

In both the no-testing and prevalent-testing environment, we find that relative to having a child without Down syndrome, having a child with Down syndrome reduces the likelihood of subsequent parental separation and increases subsequent fertility. For example, in the no-testing environment, the probability of the mother living with the father five years after birth is 8.6 percentage points (standard error = 2.8) higher if the child has Down syndrome than if they do not, and the number of subsequent births is 0.15 (standard error = 0.03) higher over the same time period. In both environments we also find that having a child with Down syndrome increases total income substantially, due to the presence of a generous child allowance for families with disabled children. This transfer is intended to compensate families for additional costs that arise as a consequence of any special needs of the child, and we are unable to observe these costs directly; thus, we are unable to determine how families disposable income (that is, after costs) changes. Nonehteless, our results speak to the impact on families of a child with Down syndrome in a setting where they may be largely insured against any additional financial costs that arise.

Impacts on maternal labor earnings are more subtle. In the no-testing environment, the incremental impact of a birth with Down syndrome is to reduce maternal earnings by an *additional* 32%, while in the prevalent-testing environment the effect is reversed, with the incremental effect of a birth with Down syndrome being a 30% *smaller* decline in maternal

[4]Conner et al. (2025) shows that the introduction of coverage for non-invasive screening in Sweden had enormous effects on take-up of screening, as well as effects on the rate of invasive testing.

[5]As we discuss in more detail below, the vast majority (97%) of parents who have a child with Down syndrome in this prevalent-testing period forgo testing. That is, only 3% of children with Down syndrome are born to parents who learned that their child would have Down syndrome and chose to retain the pregnancy. This rate is consistent with other estimates from the same setting that indicate that more than 95% of fetuses who are prenatally diagnosed with the condition are aborted (Conner et al. 2012; Zhang 2020).

earnings. This may suggest that families who anticipate being better able to accommodate a child with Down syndrome, or to face less labor-market disruptions, are more likely to select into the sample when prenatal testing is prevalent. Interestingly, in contrast to the large impacts on maternal earnings, we find much smaller impacts on fathers' earnings.

Finally, in the prevalent-testing sample we are also able to examine impacts on maternal and paternal mental health, as measured by prescription drugs fills for medication for anxiety or depression.[6] Our results suggest that the arrival of a child with Down syndrome – relative to a child without – causes a temporary increase in maternal consumption of these mental health drugs, but no longer-run difference. We do not find any impacts on paternal mental health.

Our results contribute to a growing literature on the impact of adverse childhood health shocks on family outcomes. There is substantial correlational evidence documenting worse labor market outcomes for parents in families where a child has a disability (see Stabile and Allin (2012) for a review of some of this literature), although the direction of causality in these correlations is not clear given the evidence of a causal, positive impact of household resources on children's health (see, e.g., Gertler 2004, Currie 2009, Hoynes, Miller, and Simon 2015). More recently, several papers have exploited childhood health shocks to study the causal impact of childhood health on parental labor market outcomes in the context of Northern Europe. These emerging contemporary studies have painted an important picture, showing that childhood health shocks – such as cancer diagnoses, hospitalizations, and type-I diabetes diagnoses – tend to lead to decreases in parental labor market outcomes (Gunnsteinsson and Steingrimsdottir 2019, Eriksen et al. 2021, Vaalavuo, Salokangas, and Tahvonen 2022, Adhvaryu et al. 2023, Breivik and Costa-Ramón 2024). Our paper contributes to this literature by studying a health shock that is coincident with the arrival of the child rather than one that emerges in childhood, and by studying a range of parental outcomes including but not limited to labor market activity.[7] Further, unlike this existing literature, we do not exclusively find evidence of negative impacts on parental labor market activity. In fact, in the prevalent-testing environment, we find that the arrival of a child with Down syndrome has a positive impact on maternal labor market outcomes. Our paper is also closely related to recent work that uses data from Taiwan to study the impact of the arrival of a child with cerebral palsy (CP), a childhood disability that is often – though not always – present at (or caused by circumstances during) birth. Contrary to our findings, the

[6]Data on prescription drugs are only available from July 2005 and onward.

[7]Adhvaryu et al. (2023) also studies impacts on fertility and shows that a child's cancer diagnosis causes an increase in fertility – but only in cases where the child's cancer diagnosis leads to death of the child ("replacement fertility"). In our setting, the increases in fertility raise total family size. Breivik and Costa-Ramón (2024) also show that a childhood hospitalization impacts parental mental health.

researchers find that the arrival of a child with CP increases parental separation, decreases subsequent fertility, and leads to a persistent increase in maternal depression.[8] Other related work studies the impact of childhood death on parental well-being (Berg, Lundborg, and Vikström 2017).[9]

Our paper also relates to a large body of research across many countries that has estimated the impact of children on the labor market outcomes of women (Kleven, Landais, and Søgaard 2019a; Andresen and Nix 2022), including in Sweden (Angelov, Johansson, and Lindahl 2016; Kleven, Landais, and Leite-Mariante 2024; Sundberg 2024).[10] To this literature, we contribute novel evidence on the differential impact of the arrival of a child with and without Down syndrome and an examination of a range of measures of well-being including but not limited to labor market outcomes. Our empirical approach is modeled after the so-called "child penalty" literature that estimates the impacts of childbirth on parental outcomes (see, e.g., Angrist and Evans 1998; Bertrand, Goldin, and Katz 2010; Kleven, Landais, and Søgaard 2019b; Sieppi and Pehkonen 2019; Casarico and Lattanzio 2023; Cortés and Pan 2023; Kleven, Landais, and Leite-Mariante 2024).[11]

2 Setting and data

2.1 Setting

Down syndrome is the most common chromosomal abnormality, estimated to occur (in our empirical setting) in approximately 0.1% of pregnancies that are carried to at least 11 weeks (Conner and Malcus 2017). The primary risk factor for the birth of a child with Down syndrome is advanced maternal age (Coppedè 2016).[12]

Individuals with Down syndrome have a higher incidence of many health conditions

[8] Consistent with other work on childhood health shocks from Northern Europe referenced above, Chen, Lin, and Lo (2025) also find a decrease in maternal labor force participation.

[9] In our setting, the childhood mortality rate is very low among Down syndrome children and our results are not driven by the small share of families who experience a child death. Even more broadly, our work relates to the literature on the impact of adverse health events – not only during childhood – on family behavior and well-being (see, e.g., Fadlon and Nielsen 2019, 2021).

[10] Goldin (2021) provides an in-depth overview of the relationship between career and family for women over the course of the last century.

[11] Finally, to the extent that parents of children with Down syndrome would have preferred to terminate the pregnancy under full information, our work relates to an emerging body of work studying the impacts of pregnancies that are unplanned or undesired. Gallen et al. (2023) shows that child penalties are larger for unplanned pregnancies, and Londoño-Vélez and Saravia (2024) document labor market costs of carrying an undesired pregnancy to term.

[12] Specifically, Down syndrome originates from mistakes in cell divisions during the development of the gamete or embryo (Coppedè 2016). For a given woman, the occurrence of such an aberration is a random event, but the probability of an aberration increases with maternal age (Sherman et al. 2007).

throughout the life cycle, including congenital heart defects and gastrointestinal malformations; learning disabilities and leukemia in childhood; and early-onset dementia in adulthood (Wiseman et al. 2009; Englund et al. 2013). Yet, individuals with Down syndrome are affected by these conditions to a variable extent (Wiseman et al. 2009), and improved medical care for individuals with Down syndrome has contributed to a dramatic increase in life expectancy over the last couple of generations, to around 60 years for children in the cohorts that we study (Englund et al. 2013).[13]

In our empirical context, children with Down syndrome overwhelmingly live with their parents (Englund et al. 2013). Families have the right to free schooling that is tailored to the needs and abilities of their child. Families also are eligible to apply for financial transfers, which we refer to as a "care allowance," that are intended to compensate for the additional costs that arise.

Specifically, parents of children with special needs that require "special supervision and care for a period of at least six months" are eligible to apply for the care allowance, which is paid out from the onset of the child's disability until June of the year the child turns 19 (Inspektionen för Socialförsäkringen 2021).[14] The care allowance amount awarded is increasing in the care needs of the child, defined as needs that are above and beyond what would be expected for a child without special needs at the same age.[15] Importantly, however, the level of compensation is not linked to previous income, or to lost parental work income.[16]

Like everyone else in Sweden, children with disabilities have access to nearly-free healthcare, with low copays. We thus study a setting where families may be largely insured against the additional *financial* costs that arise as a consequence of the child's disability.

Further, like everyone else in Sweden, parents of children with Down syndrome have access to generous parental leave. During the time period covered in our analysis, the program was gradually expanded from a per-child benefit of 12 months of wage-replaced leave to a per-

[13] As many as 40-50% of children born with Down syndrome have a congenital heart defect, and improved cardiac surgery is quoted as a major reason for the drastic reduction in early mortality. In our empirical context, heart surgery for infants with Down syndrome was introduced on a wide scale in the 1980s (Englund et al. 2013). Beyond improvements in health care, the end of the practice of institutionalizing children with Down syndrome is often quoted as another reason for the increase in life expectancy and quality of life of individuals with Down syndrome (Englund et al. 2013, Global Down Syndrome Foundation 2018).

[14] The care allowance can be paid out to both parents, but mothers often receive the bulk of the transfers. The care allowance rules also changed in 2019, the last year of data that we use. Appendix B provides details. As we discuss further below, in practice our data allow us to observe payments of the care allowance to each parent, in each year, both prior to and after the 2019 reform.

[15] See Inspektionen för Socialförsäkringen (2010) for information about the levels of compensation in the Vårdbidrag (awarded prior to 2019) and Inspektionen för Socialförsäkringen (2021) for information about the levels of compensation in the Omvårdnadsbidrag and Merkostnadsbidrag (awarded starting in 2019).

[16] Parents of children with a range of disabilities receive care allowance, inclding children with autism, Down syndrome, hearing problems, and ADHD.

child benefit of 15 months of wage-replaced leave (Duvander, Haas, and Hwang 2017).[17] As the leave is awarded per child, it can be split betweeen the mother and father.[18] Parental leave benefits do not need to all be used in one spell; they can be claimed at any point until the child turns 8 or, more recently, 12 years old.

2.2 Data sources and sample construction

The backbone of our data is an extract from the Swedish Population Register of all individuals who resided in Sweden at some point from 2000 through 2016 (Skatteverket, n.d.). For all women in this population, we obtain Medical Birth Records (MBR) from the National Board of Health and Welfare (Socialstyrelsen 2019) that contains information about all live births in Sweden from 1991 through 2019.[19] For each birth we observe the mother and child identifiers, the exact date of birth, and singleton versus multiple birth indicators.[20] Importantly, the birth records also include the child's diagnoses at birth (ICD codes), which allows us to capture chromosomal abnormalities (when they exist); Appendix B lists the exact ICD codes.

We also observe several Swedish administrative registries providing information on both parents and children. From the Swedish Population Register, we observe precise biological parent-child linkage information, which allows us to link each child identifier to the identifier of their biological father. We then link the biological parents of each child to Statistics Sweden's longitudinal database of individuals (LISA) from 1990 through 2019 (Statistics Sweden 2019) to obtain parental demographics, educational attainment, marital status, and various categories of calendar-year income (total income, earnings, unemployment insurance, parental leave compensation, care allowance, capital income, and transfers made to individuals who are studying, which we refer to as study income).[21] All income categories are measured at the individual level. As we discuss in Section 2.1, prior to 2019 the care

[17] In addition, the program featured a per-child benefit of additional months of leave with a flat-rate benefit. The replacement rate varied somewhat over time but was approximately 78% of prior gross earnings, up to a ceiling (Duvander, Haas, and Hwang 2017).

[18] At the program's inception in 1974, parents had complete discretion over the division. However, as the vast majority of the leave days were taken by mothers, a series of so-called "lose it or use it" reforms have been enacted over time, which preclude transferring all parental leave to the mother; yet, mothers still take the majority of parental leave.

[19] The MBR contains the universe of pregnancies carried 22 weeks or longer (28 weeks or longer for births prior to July 1, 2008). In this project we restrict attention to live births.

[20] The child identifier is missing for a small share of births where the child dies shortly after birth, before obtaining a social security number. This occurs for 0.1% of singleton births with Down syndrome and for 0.1% of singleton births with no chromosomal abnormalities. As we cannot link these children to their fathers, we exclude them from our main analysis.

[21] We convert all monetary outcomes from Swedish Kroner to US dollars in 2018 using exchange rates and inflation rates from Sveriges Riksbank (2025) and Statistics Sweden (2025), respectively.

allowance was always awarded to one parent, but the parents could subsequently decide to split the allowance and have the government pay out a portion to each parent; in 2019 (our last year of data), both parents could apply for the care allowance. Our data shows the payments of the care allowance made to each parent, in each year; thus we continuously define the care allowance at the individual level as the amount paid out to that parent.

We also link parents to their spouses using marital records and to their cohabiting partners using information about addresses and shared biological children. This allows us to construct annual measures of whether the mother is living with and/or married to the father of the child.

Finally, from the National Board of Health and Welfare (Socialstyrelsen 2019) we obtain death records, inpatient and specialist outpatient records, and prescription drug records. The death records document all deaths through 2019 and thus allow us to track measures of child mortality. The patient records capture all inpatient visits from 1991 through 2019 and all specialist outpatient visits from 2002 through 2019. These records allow us to capture (for a robustness exercise) children who were not diagnosed with Down syndrome at birth, but who were subsequently diagnosed in the first three months after birth. The prescription drug records capture all fills from July 2005 through December 2019, and includes information about the exact date of filling a drug and the drug's Anatomical Therapeutic Chemical (ATC) classification code. We use these prescription drug records to construct indicator variables for any purchase of a drug that is classified as anti-anxiety or antidepressant. Appendix B lists the exact ICD and ATC codes and provides more details about these data sets and the exact variables used.

Sample restrictions. For our sample described above, the MBR contains information on 3.04 million live births in Sweden over our 1991-2018 time period, of which 3,946 (0.13%) are associated with some chromosomal abnormalities. Beginning with this initial sample, we make several sample restrictions that result in our final sample. Appendix Table A1 provides more details, and we summarize the key restrictions below.

We first restrict attention to singleton births, which comprise approximately 97% of pregnancies in the original sample. We then restrict to the approximately 99% of births that can be linked to a biological father identifier. This intermediary sample consists of about 2.9 million births, of which $3,691$ (0.13%) are associated with chromosomal abnormalities. In order to follow the empirical approach described below, which facilitates a "cleaner" comparison, we then drop 874 (24%) births associated with chromosomal abnormalities that are different from Down syndrome, and we drop approximately 0.1% of births with no chromosomal abnormalities because the family has a documented experience of other births

of children with chromosomal abnormalities. After losing a few (very small) additional observations due to data issues,[22] our final sample consists of 2.9 million births, of which 2,805 (0.10%) have Down syndrome and the rest have no documented history (to the child or other children in the family) of any chromosomal abnormalities.

Panel A of Figure 1 presents the time series of Down births over the 28 years of our sample. There are on average about one hundred Down births per year and their share has been mostly stable, at about 0.1% of live births.[23] Toward the end of the sample, there has a been a mild trend downwards, presumably due to the improvement in and greater availability of prenatal testing, which we turn to next.

2.3 Prenatal testing

Our analysis spans a period of dramatic change in prenatal testing. During the first half of our study period, the primary form of prenatal testing was an invasive diagnostic procedure – initially amniocentesis and later also chorionic villus sampling (CVS) – in which a needle is inserted into the womb to extract fetal cells (from which fetal DNA is subsequently extracted) from the amniotic fluid (amniocentesis) or placenta (CVS). These tests provide a definitive diagnosis of any fetal chromosomal abnormalities but, because they are invasive, the procedure carries a risk of inducing a miscarriage. As a result, invasive testing was typically not recommended to pregnant women, but was made available to those who requested it (Statens Beredning för Medicinsk Utvärdering 2006).

As described and studied in more detail in Conner et al. (2025), starting in the early 2000s, advances in genetics have contributed to the development of non-invasive screenings for chromosomal abnormalities. Non-invasive screening poses no risk of miscarriage and costs less than an invasive diagnostic test, but it is also less informative about the presence of chromosomal abnormalities. In particular, unlike an invasive test, a non-invasive screen only provides a risk assessment, not a definitive diagnosis. Non-invasive screening is therefore typically used to inform decisions about whether or not to conduct a subsequent invasive test. The advent of these non-invasive tests is likely responsible for the decline in the share of children born with Down syndrome, shown in Panel A of Figure 1. Indeed, starting in 2005, various regions in Sweden began introducing public insurance coverage for the new screenings, making them available to pregnant women for free or for a small copay.[24]

[22] See the table notes to Appendix Table A1 for more information.

[23] It's unclear what is driving or what could be driving the sharp spike in Down births in 2006, which is roughly 5 standard deviations higher than the annual mean. As we show below, all our results are robust to dropping 2006 births from the sample.

[24] In June 2005, Stockholm was the first region to introduce universal coverage for the first-generation non-invasive prenatal screening technology – nuchal translucency (NT) – and other regions added (universal

Panel B of Figure 1 presents the rate of invasive prenatal testing over time, overall and by maternal age. For pregnant women under age 35, a group associated with lower risk of carrying a fetus with Down syndrome (and chromosomal abnormalities more generally), the invasive testing rate prior to 2005 was less than 1%. After 2005 the rate increased to approximately 2%, likely due to increased availability of non-invasive screening, which led to recommending follow-up invasive tests to women whose screen indicated higher risk (Conner et al. 2025). For women aged 35 or higher, the rate of invasive testing was initially much higher, reflecting their higher baseline risk. However, after 2005 invasive tests for these women have declined due to the introduction of non-invasive prenatal screening, which has allowed many of them to substitute from the riskier invasive procedure toward a safe non-invasive screening (Conner et al. 2025).

The patterns in Panel B of Figure 1 highlight that it is important to consider the period after 2005 separately. Conner et al. (2025) documents that the introduction of coverage for non-invasive prenatal screening has enormous effects on take-up of the screen, as well as the downstream effects on invasive testing shown in Panel B of Figure 1. This means that, in the period after 2005, when coverage of non-invasive testing is rolled out across Sweden's regions, the share of expecting parents who obtain information about the health of their fetus through prenatal screening or testing – and subsequently can make decisions about whether to keep the pregnancy based on this information – is *much* larger than the rate of invasive testing shown in Panel B of Figure 1. In contrast, prior to 2005, the rates of invasive testing can be thought of as reflecting the share of parents who obtain precise information about the health of their offspring. This distinction will be important in our empirical analysis, as it means that we may have selection into our sample in the post-2005 period.

Specifically, our empirical analysis below compares the impact on families of having a child with Down syndrome compared to the impact of having a child with no chromosomal abnormalities. This comparison has a straightforward interpretation in the absence of prenatal testing, since the birth of a child with Down syndrome is random conditional on maternal age.

In the post-2005 era, however, our sample will be selected to parents who choose not to undergo prenatal screening (or to not act on the information obtained). Given the widespread availability of prenatal testing in society today, it is also of interest to consider the impact of having a child with Down syndrome in this environment. Therefore, we will first present results for a sample of births for which there is (effectively) no prenatal testing. Next, we will present separate results for births that take place under widespread availability of prenatal testing – a more "current" scenario.

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or partial) coverage over time (Engström, Annika 2006).

3 Empirical approach

3.1 Measurement approach

Our basic empirical approach is straightforward and in the spirit of Kleven, Landais, and Søgaard (2021), who compare parental outcomes following the birth of a biological child and an adopted child. Loosely, we consider all live births (in Sweden) during the observation period, and compare outcomes associated with live births of children with Down syndrome ("Down") against outcomes associated with comparable live births of children with no chromosomal abnormalities ("NCA").

We denote each live birth by i, which is associated with the year $d(i)$ in which it occurred and one of two types $j(i) \in \{NCA, Down\}$. While our baseline analysis considers all births, it will be instructive to illustrate the key assumptions in the context of first births only. Within this simplified context, we consider the following j-specific event study, which we estimate separately for each $j \in \{NCA, Down\}$:

$$y_{it} = \gamma^{j(i)}_{r(i,t)} + \tau^{j(i)}_t + x'_{it}\alpha^{j(i)} + \epsilon_{it}, \tag{1}$$

where y_{it} is the family outcome of interest for birth i in calendar year t, $r(i,t) \equiv t - d(i)$ denotes the year relative to the birth of the child, τ^j_t are type-specific calendar year effects, and x_{it} is a vector of observable characteristics; in our baseline specification the x_{it} are indicator variables for maternal age (in years) in year t.

The main coefficients of interest are the γ_r's, which are indicator variables for years relative to the birth year. We normalize $\gamma_{-2} = 0$ so that all relative-year effects are measured relative to two years before birth (in order to accommodate possible pregnancy effects in the year before birth). For all of these event study analyses, we examine outcomes for five years pre-pregnancy (i.e. $-6 \leq r \leq -2$) and five years post-birth (i.e. $1 \leq r \leq 5$). We report (but generally ignore) outcomes in $r = -1$ and $r = 0$ since they reflect possible impacts of pregnancy and child-birth.[25]

To directly compare how outcomes evolve following a first birth for a child with Down syndrome relative to a first birth for a child with no chromosomal abnormalities, we pool the two types of live births and estimate

$$y_{it} = \phi_{r(i,t)} + \theta_{r(i,t)} \cdot Down_i + \tau^{j(i)}_t + x'_{it}\alpha^{j(i)} + \epsilon_{it}, \tag{2}$$

[25] If we assume 9-month pregnancies and a uniform distribution of the date of birth within the calendar year, a woman is on average pregnant for 3.6 months of $r = -1$ (the year prior to the year of birth) and 5.4 months of $r = 0$ (the year of birth).

where $Down_i$ is an indicator that takes the value of 1 if birth i has Down syndrome. The θ_r's capture the key coefficients of interest; we normalize $\theta_{-2} = 0$ so that all effects are measured relative to two years before birth.

In practice, first births only account for about one-third of the Down-syndrome live births in our data. We will therefore also report results from estimating equations (1) and (2) separately for second births and for third and higher-order births. We will also pool all live births of a given type j (either Down syndrome or not) in a single regression, by estimating

$$y_{it} = \gamma_{r(i,t)}^{j(i)} + \lambda^{b(i),j(i)} + \tau_t^{b(i),j(i)} + x_{it}'\alpha^{b(i),j(i)} + \epsilon_{it}, \tag{3}$$

where $b(i) \in \{1, 2, 3+\}$ captures the birth order associated with live birth i. We allow for the outcome to depend on birth order, $\lambda^{b(i),j(i)}$, and for the relationship between the outcome and calendar year and the outcome and observable characteristics x_{it} to vary flexibility with birth order. The coefficients of interest, the γ_r^j coefficients, capture the type-specific relative-year average (across birth parity) effects, relative to two years prior to birth.

Likewise, to compare how outcomes evolve following a birth with Down syndrome relative to one with no chromosomal abnormalities, we extend equation (2) to cover other birth orders by estimating

$$y_{it} = \phi_{r(i,t)} + \theta_{r(i,t)} \cdot Down_i + \lambda^{b(i),j(i)} + \tau_t^{b(i),j(i)} + x_{it}'\alpha^{b(i),j(i)} + \epsilon_{it}. \tag{4}$$

This pooled specification maximizes statistical power on the coefficients of interest, the θ_r's, which capture the average impact of a live birth with Down syndrome across *all* Down-syndrome live births (regardless of birth parity) relative to all live births without Down syndrome, again regardless of all birth parities.

Below, we will primarily report results from estimating equations (3) and (4). The key coefficients of interest, the θ_r's in equation (4), capture the average impact of having a child with Down syndrome relative to having a child with no chromosomal abnormalities.

3.2 Analysis samples

As described earlier, trends in prenatal testing can affect both our estimates and their interpretation. Our primary analysis focuses on an environment in which prenatal testing is essentially non-existent, so it can be (almost) viewed as a world with no prenatal testing. Specifically, this no-testing environment consists of all live births to younger women (34 years old or lower) prior to 2005. As seen in Panel B of Figure 1, invasive testing rates in this sample were less than (1%), so the potential for selection into the sample – due to early

termination of Down pregnancies – is negligible. This makes the interpretation of our results in this sample easy and straightforward: our estimates reveal the population average effect of unexpectedly having a child with Down syndrome relative to having a child with no chromosomal abnormalities. At the same time, the results for this sample may be less applicable in more recent years, in which prenatal testing (including both invasive and non-invasive) is much more prevalent. We therefore also report results from a second, prevalent-testing environment, which contains all live births after 2005 (through 2018, the last year of our sample). For this prevalent-testing sample, there *is* selection into the set of parents who have a Down syndrome child, and the impact of such a child on this selected set of parents may be different than for the population average.

Table 1 in reports summary statistics for all mothers, by Down status.[26] We report results separately for births in the no-testing (Panel A) and the prevalent-testing (Panel B) environments. We observe 928 births with Down Syndrome in the former, and 1,241 in the latter; these births are approximately evenly split between first births, second births, and third-or-higher births. The first row shows that maternal age at birth is markedly higher for children with Down syndrome, as would be expected given that the propensity to have a pregnancy with Down syndrome increases with maternal age (Conner and Malcus 2017), although one can observe children with Down syndrome born to mothers of all ages (See Appendix Figure A3). To facilitate other comparisons across mothers by Down status, in the rest of the table rows we therefore re-weight the statistics for mothers of children without Down syndrome so that they have the same age distribution as mothers of children with Down syndrome. All of the maternal characteristics are presented in the two years prior to birth.[27]

Panel A shows that, in the no-testing environment, conditional on maternal age, mothers of children born with Down syndrome and mothers of children with no chromosomal abnormalities are similar on observables (two years prior to birth) – both substantively and statistically – including earnings, marital status, education, and birth parity. This is consistent with the arrival of a child with Down syndrome being essentially random conditional on maternal age in this sample, and thus with our interpretation of the results for this sample representing the population average impact of having a child with Down syndrome.

By contrast, panel B shows that in the prevalent-testing environment, conditional on maternal age, mothers who give birth to children with Down syndrome are different on ob-

[26]For brevity, the table column headers are "Down" and "no Down". In practice, the "no Down" column shows summary statistics for mothers whose child has no chromosomal abnormalities (neither Down nor any other chromosomal abnormality). Henceforth we will refer to the latter sample as the "no Down"-sample.

[27]As before, we choose two years prior to the year of birth since on average women are pregnant for part of the year prior to the birth year.

servables: they are less likely to work, more likely to be married, and have lower educational attainment. These differences are not only statistically distinguishable but also substantively non-trivial. For example, mothers who give birth to a child with Down syndrome are 5 percentage points less likely to work two years prior to birth (relative to a mean of 86% among mothers who give birth to a child without Down syndrome), and are 4 percentage points more likely to have no college education (relative to the mean of 43% for mothers whose children do not have Down syndrome). This is consistent with selection into the sample of families with a Down syndrome child in the prevalent-testing sample, and it will affect our interpretation as we discuss below.

4 Results

We focus first on the no-testing environment, and then compare these results to what happens in the presence of prevalent testing.

Family relationships. Figure 2 shows the impact of having a child with Down syndrome relative to a child without Down syndrome on whether the mother lives with the father (panels A and B) and on the (cumulative) number of subsequent births (panels C and D). The left column (panels A and C) report results from estimating equation (3) separately for mothers who give birth to a child with Down syndrome (solid red lines) and those who give birth to a child without chromosomal abnormalities (dashed blue lines). The right column (panels B and D) report results from estimating equation (4), which shows the relative impact of a child with Down syndrome compared to a child without Down syndrome.

Not surprisingly, in the years prior to birth, the probability of living with the (subsequent) father is increasing rapidly (panel A); this increase is the same for women who subsequently give birth to a child with or without Down syndrome. Having a child with Down syndrome increases the probability that the mother and father of the child live together in the subsequent years. It also increases the number of subsequent births (panel D).

The impact on subsequent births is entirely driven by families whose second child has Down syndrome (Appendix Figure A4). That is, having a first child with no chromosomal abnormalities, followed by a second child with Down syndrome, increases the probability that the mother will have a third child. However, when the Down child is the first or the third or later child, the impact of Down on subsequent births is negligible.

By contrast, the impact of a child with Down syndrome on the probability that the mother and father still live together does not vary with birth order (Appendix Figure A5). Interestingly, when we look out 14 years (the longest time horizon we can observe after

all births in the no-testing sample), while the impact on the number of subsequent births slightly attenuates in the later years, the impact on the probability of living with the father does not diminish (Appendix Figure A6).

Economic outcomes. Figure 3 presents impacts on maternal labor earnings and income. Consistent with the so-called "child penalty" literature (Angelov, Johansson, and Lindahl 2016; Kleven, Landais, and Søgaard 2019a; Andresen and Nix 2022; Gallen et al. 2023; Kleven, Landais, and Leite-Mariante 2024), the blue line in panel (A) shows that maternal earnings fall substantially following the birth of a child without Down syndrome. The red line indicates that this earnings decline is larger for mothers who give birth to a child with Down syndrome; panel (C) indicates that both types of mothers experience a decline on the extensive margin of earnings, but there is less evidence of a differential effect on that margin. Despite the larger decline in maternal earnings for mothers who give birth to a child with Down syndrome, overall maternal income increases for these mothers relative to those who give birth to a child without Down syndrome (panel E); this is driven entirely by the increased "care allowance" available to mothers who give birth to a child with Down syndrome (panel G), presumably reflecting higher average expenses associated with a child with Down syndrome. Also consistent with the existing literature, we find that the birth of a child has little impact on paternal earnings or income; moreover, we find no differential impact of a child with Down syndrome relative to one without Down syndrome on these outcomes (Appendix Figure A14). Finally, Figure 4 examines impacts on maternal and paternal income from parental leave in each year. For mothers, parental leave income increases sharply after a birth (panel A), but the incremental effect of a Down syndrome birth (panel B) flips from negative in the year of birth to positive two years after the birth.

Magnitudes. Table 2 summarizes the estimates from these event study figures. For each outcome, the table reports the average prior to pregnancy (i.e. year -2), the estimated 5-year impact of a birth without Down syndrome, and the incremental 5-year impact of a birth with Down syndrome.

Panel A reports results for family relationships and subsequent children. Prior to the birth, about 50% of mothers are living with the subsequent father (column (1)); five years after the birth of a child without Down syndrome, this probability has risen by about 23 percentage points (column (2)). Interpreting this causally is tricky since there is an (expected) pre-trend of increasing probability of co-habiting with the eventual father of your child in the years prior to their birth (recall Figure 2, panel A). However, relative to mothers who give birth to a child without Down syndrome, mothers who give birth to a child with Down

syndrome are 8.6 percentage points (standard error =0.03) more likely to still be living with the father five years later (column (3)); this represents the causal impact of a Down birth on couple stability.

Over this same 5-year post birth period, mothers whose child does not have Down syndrome on average give birth to about 0.6 more children; the number of subsequent children is 0.15 (standard error = 0.03) higher for mothers who give birth to a child with Down syndrome. As noted, this effect is concentrated among mothers whose second child has Down syndrome: On average, after a second birth, mothers have 0.35 more children in the subsequent 5 years, but mothers whose second child had Down syndrome have an additional 0.27 (standard error = 0.05) subsequent children over the same time period. This represents a 77% increase in the number of subsequent children for this sub-population.[28]

Panel B reports results for maternal economic outcomes. For births without Down syndrome, maternal earnings fall on average by about $6,400 over the five years after birth, or about 45% relative to pre-birth earnings, a fairly typical finding in this literature. However, for mothers who give birth to a child with Down Syndrome, average maternal earnings in the five years after birth fall by an additional $2,060 (standard error = 590), which represents a 32% larger (in absolute value) decline. Some of this maternal earnings decline comes from an extensive margin decline in the probability of employment. For mothers who give birth to a child without Down syndrome, the likelihood of being employed has fallen by about 10 percentage points five years post childbirth (from 87% prior to birth).[29] For mothers who give birth to a child with Down syndrome, the likelihood of being employed has fallen by an additional 2.7 percentage points (standard error = 0.02) over the same time period.

Despite their $2,000 larger earnings decline, mothers who give birth to a child with Down syndrome have on average about $7,700 (standard error = 575) higher total income in the five years after giving birth relative to mothers who give birth to a child without Down syndrome. This almost entirely reflects the child care allowance.[30] As the child care allowance is intended to compensate families for additional care needs and expenses stemming from special needs of the child, it is likely the case that these large increases in total income are – at least in part – offset by larger expenses (which our data does not allow

[28]This effect is akin to the well-known impact on subsequent fertility of having first- and second-born children of the same gender. For example, Angrist and Evans (1998) find that women with two children of the same sex are seven percentage point more likely to have an additional child, corresponding to a 20% increase in the likelihood of having a subsequent child.

[29]This estimate is similar to other estimates from Sweden (Kleven, Landais, and Leite-Mariante 2024; Sundberg 2024), although we note that we do not expect our estimate to be identical, as we do not restrict our analysis sample to firstborn children.

[30]There are of course other small components of income besides earnings and care allowance. Appendix Figure A7 and Appendix Table A2 summarize impacts on these other dimensions; the differential impact from the birth of a child with Down syndrome is concentrated in earnings and care allowance.

us to observe). Thus, after accounting for the likely additional (unobserved) expenses, it is not clear that families with a child with Down syndrome actually enjoy higher disposable incomes.

Appendix Table A3 shows that for paternal economic outcomes, there is little impact of the birth of a child and little relative impact from the birth of a child with Down syndrome.

Comparison to results under "prevalent testing." The results presented thus far are all from the no-testing sample, and are therefore easy to interpret. Yet their external validity to the context of the prevalent-testing environment of the last two decades is less obvious. We therefore report a parallel set of estimates for the prevalent-testing sample previously described in Table 1, panel B. In this sample, 97% of live births with Down syndrome are to parents who did not undergo invasive testing; 3% are to parents who underwent invasive testing and continued the pregnancy. Therefore, as in the no-testing sample, the vast majority of births with Down syndrome in this sample are still unexpected. However, we are now estimating the impact of a birth with Down syndrome on a non-random subset of parents. These are parents who either choose not to undergo non-invasive prenatal screening – despite it likely being cheap and readily available – or parents who undergo non-invasive screening but then choose not to proceed to invasive testing (despite a non-invasive screening result suggesting a heightened probability of the presence of a chromosomal abnormality). This is likely a selected group of parents who either anticipate that they would keep a fetus with Down syndrome and therefore do not acquire any information at all, or who place high enough a disutility on the risk of a miscarriage relative to the risk of having a child with Down syndrome to choose not to undergo subsequent invasive testing (Conner et al. 2025).

Table 3 summarizes the results.[31] The first two columns repeat the results for the no-testing sample shown in Table 2, while the remaining columns report results for two other samples: the entire prevalent-testing sample (columns (3) and (4)), and women aged 34 or younger within the prevalent-testing sample (columns (5) and (6)); about one-half of the births with Down syndrome in the prevalent-testing sample are to women aged 34 and younger. Differences between the results in the no-testing sample and the younger women in the prevalent-testing sample primarily reflect differences in the testing environment, while differences between the results from the full prevalent-testing sample and the no-testing sample also reflect cross-sectional differences in impacts across women of different ages.

Despite the difference in the prenatal testing environment, our findings regarding the impact of having a child with Down syndrome relative to one without Down syndrome on the propensity of the mother and the father to live together and on subsequent births

[31] Appendix Figures A8 through A16 show the underlying event studies for the new analyses.

remain quite similar. Although the point estimates are smaller, we continue to estimate that mothers are more likely to live with the fathers after a Down birth relative to a birth of a child without Down syndrome, and similarly the number of subsequent births increases (again, predominantly driven by cases in which the Down children are second births).

Interestingly, however, impacts on maternal economic outcomes are now somewhat different. Whereas in the no-testing sample we found that having a child with Down syndrome (relative to having a child without Down syndrome) decreased maternal earnings by about $\$2,000$ per year on average over the five years post birth (standard error = 590), in the prevalent-testing sample we now find an opposite-signed effect (of a similar magnitude): the birth of a child with Down syndrome is estimated to increase maternal earnings by about $\$2,000$ (standard error = 841) relative to a birth of a child without Down syndrome. We also now find some evidence of an increase on paternal earnings, whereas before there was no impact on paternal earnings. One possible hypothesis is that selection into having a Down child in the prevalent-testing sample selects on families who feel, on average, better able to accommodate a child with Down syndrome, and therefore face less labor-market disruptions.

Parental Mental Health. In the prevelant-testing sample we are also able to estimate impacts on maternal and paternal mental health, as measured by prescription drugs fills for medication for anxiety or depression; these data are only available from 2005 on. Unlike our other outcomes, these data are available at the day level, and we are therefore able to look directly at 12 month segments relative to the exact date of birth; year -1 now indicates the 12 months prior to birth and year 0 now indicates the first 12 months of the child's life. Figure 5 shows the results. For mothers, rates of depression and anxiety medication falls in the year prior to birth (presumably reflecting guidelines against use of anti-depressants during pregnancy) and rise afterwards; this subsequent rise likely reflects a combination of the return to pre-pregnancy medication as well as onset of post-partum depression. The results indicate that in the first 12 months after birth, medication for anxiety or depression is higher for mothers who give birth to a child with Down syndrome, but after 12 months the rates are essentially equal. This is suggestive of temporarily higher rates of post-partum depression (or perhaps higher rates of diagnosis and treatment for post-partum depression) for mothers who give birth to a child with Down syndrome, but no longer-run difference. For fathers there is no such pattern and if anything there is suggestive evidence of lower rates of medication five years after birth, although the difference is not statistically significant.

Subsequent testing. Finally, we examined how having a child with Down syndrome affects the propensity for invasive testing in subsequent pregnancies. The odds of having a

child with Down syndrome are not increasing if a prior pregnancy involved a child with Down syndrome, therefore we interpret any subsequent invasive testing as reflective of a desire for information (and potentially conditional termination of the pregnancy). We find that having a child with Down syndrome increases the probability of invasive testing substantially. In the prevalent-testing period, the rate of invasive testing for a subsequent pregnancy rises by 17 percentage points if the mother had a prior birth with Down syndrome, off of a baseline of 3.6% if the mother has had no prior births with Down syndrome.[32] We find even larger effects for the no-testing sample of women who gave birth at ages 34 or younger in 2005 or earlier. There the subsequent testing rate is 28 percentage points higher for a woman who had a prior birth with Down syndrome, off of a baseline of 0.7% for women whose prior births did not have Down syndrome.

Robustness. We present results from a series of robustness exercises in Appendix Tables A4 and A5, for the no-testing and prevalent-testing samples, respectively. To facilitate comparison with our baseline estimates, the top row in each table repeats these estimates.

First, we examine whether our results are driven by the small share of families whose child with Down syndrome dies within five years of childbirth.[33] Row (2) of each table presents results from samples that omit all children (with and without Down syndrome) who die within five years of childbirth. Our results remain largely unchanged, suggesting that our estimates reflect the impacts of the much more common experience among families with Down children, namely, the presence of a live child with Down syndrome in the family.

Second, we report results from a balanced panel, where we restrict the sample to births that we observe throughout years -2 to +5. The results remain largely unchanged.

Third, as shown in Figure 1, Panel A, we see a spike in births with Down syndrome in 2006. We therefore present estimates (for the prevalent-testing sample) where we drop all births from 2006.[34] The results remain unchanged.

Fourth, we examine the sensitivity of our results to the exact timing of diagnosis of Down syndrome. In our baseline sample, we compare parents of children who are diagnosed with Down syndrome at birth to parents of children who have no such diagnosis at birth. However, a small share of children who are not diagnosed with Down syndrome at birth are diagnosed with the condition shortly after birth, either in connection with an inpatient diagnosis or a specialist outpatient visit; our baseline analysis classifies these children as not having Down

[32]This estimate adjusts for age differences across mothers who give birth to children with and without down syndrome. Conditional on age controls, other demographic controls have no impact.

[33]This restriction drops 6.39% of Down births and 0.35% of No-Down births in the no-testing sample, and 3.49% of Down births and 0.21% of No-Down births in the prevalent-testing sample.

[34]This restriction drops 12.25% of Down births and 7.28% of No-Down births.

syndrome. In our final robustness exercise we define a child as having Down syndrome if the child is diagnosed at birth or within three months post-childbirth.[35] The results remain largely unchanged.

5 Conclusion

New prenatal screening for Down syndrome is widespread and a large share of prenatally diagnosed pregnancies are terminated (Conner et al. 2012). This suggests that many expectant couples may worry, either about the potential consequences on their own lives of having a child with Down syndrome, or about whether a child with Down syndrome would have a good life.

At the same time, individuals with Down syndrome overwhelmingly report that they live happy and fulfilling lives.[36] Further, survey evidence suggests that parents of children with Down syndrome enjoy higher life satisfaction along several dimensions when compared to parents with a child without Down syndrome. These parental accounts may in part reflect selection, however – even in an environment without prenatal screening and testing, as mothers who give birth to children with Down syndrome are older, on average – and there is little systematic evidence on the causal impact of having a child with Down syndrome.

This study begins to fill this gap. We use unique administrative data from Sweden that allow us to observe all children born from 1991 through 2018 – with and without Down syndrome – and trace outcomes that capture their parents' wellbeing both before and after the child's arrival. The early years of our data represent an environment with essentially no prenatal testing – where the birth of a child with Down syndrome was essentially random conditional on maternal age – and the more recent period features widespread prenatal screening.

Our analysis shows that unexpectedly having a child with Down syndrome reduces the likelihood of parental separation and increases subsequent childbearing. These results hold both in the no-testing environment and in the prevalent-testing environment. The impact on maternal earnings is more nuanced: earnings fall in the no-testing environment, but this effect reverses once prenatal information acquisition is common.

Our results on couple stability and subsequent fertility are at odds with the predicted effects of the arrival of a Down syndrome child in a survey that we ran, among more than

[35] This reclassification yields 6.79% more Down births in the no-testing sample, and 12.89% more Down births in the prevalent-testing sample (and equally many fewer No-Down births).

[36] In a recent survey from the United States that asked people with Down syndrome about their lives, 99% of respondents indicated that they lived happy and fulfilling lives (B. Skotko, S. Levine, and Goldstein 2011).

150 scientists studying the economics of health and the economics of the family, in early 2025. To the extent that a common prior, more broadly, is that the arrival of a child with Down syndrome would induce marital dissolution and reduce subsequent childbearing, our results offer a sharp counterpoint.

These results obtain in a setting where families are largely insured against any additional financial costs that arise from special needs of the child. Future research is needed to understand how the arrival of a child with Down syndrome impacts families in settings with less insurance.

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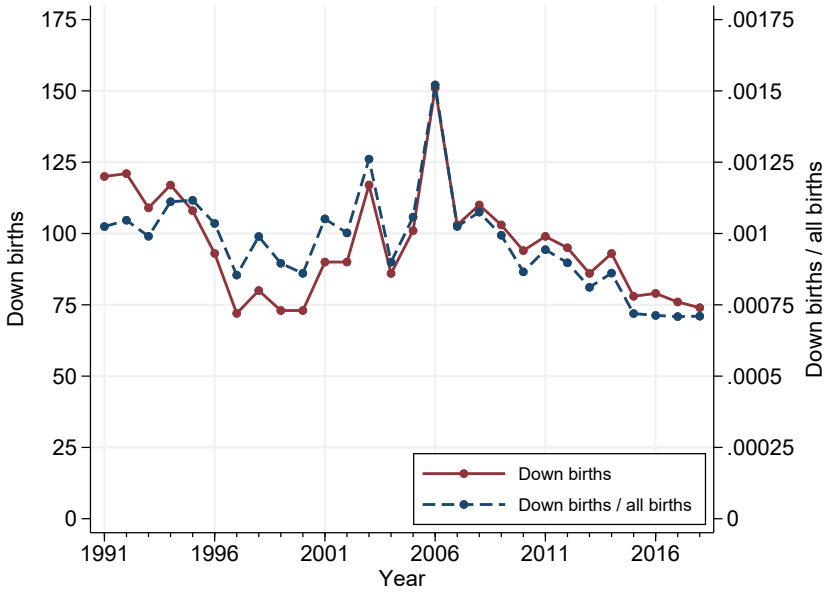
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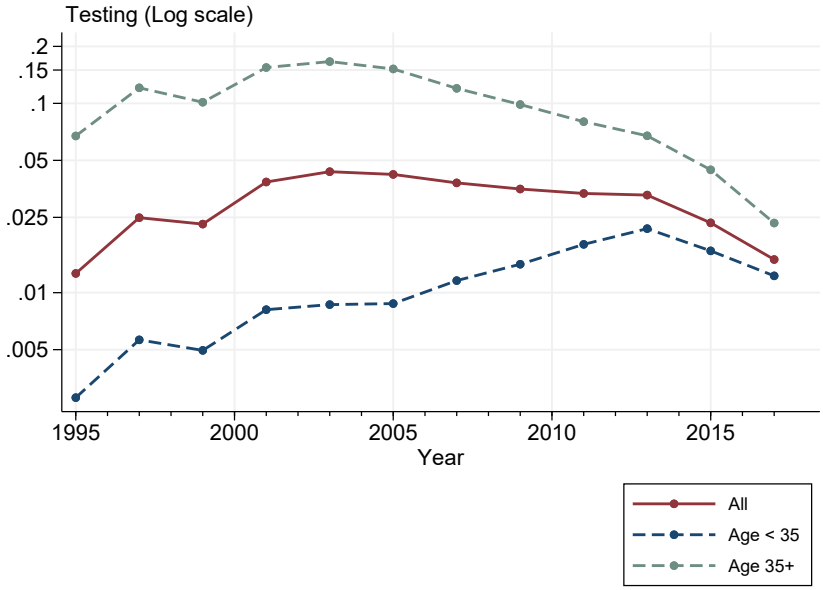
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Figure 1: Trends in Down Births and Invasive Testing

A. Down Births

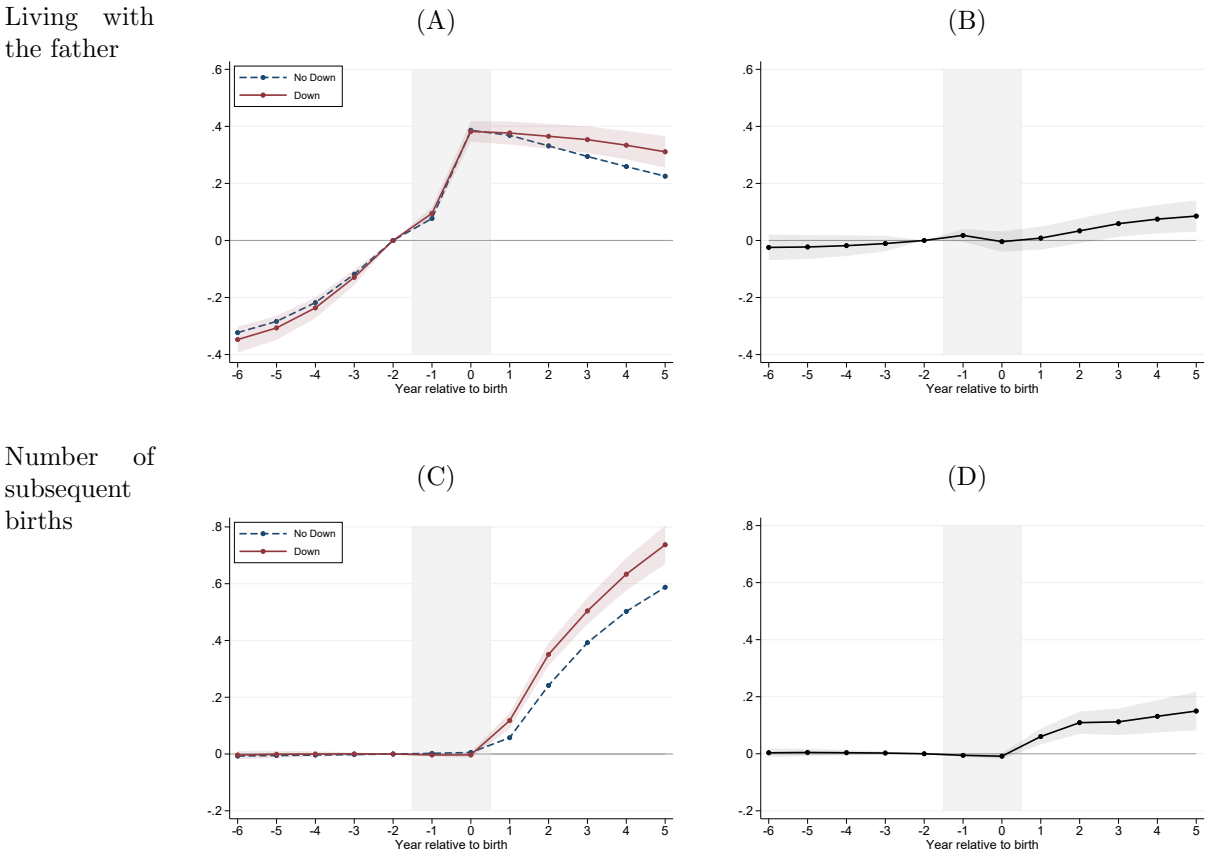


B. Invasive Testing Rates



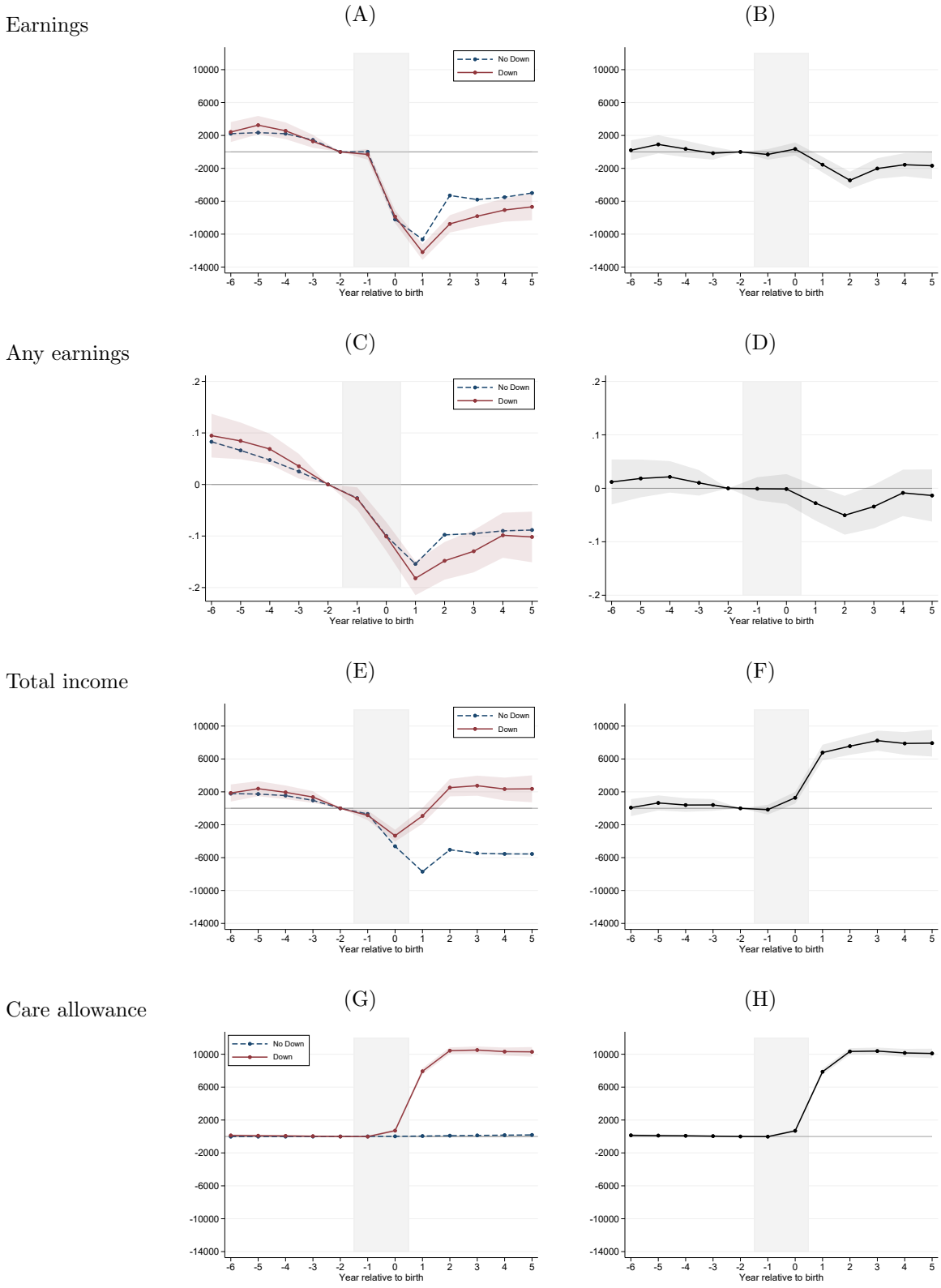
Note: Figure shows trends in (A) the number and share of Down births and (B) the two-year average of an indicator for invasive testing by year for our baseline sample (absent any maternal age or birth year restrictions). Invasive testing includes both amnio and CVB testing. The full sample in (A) contains 2,805 Down and 2,909,021 No-Down births, and the sample restricted to births in 1995 and later in (B) contains 2,347,221 total births, of which 1,825,392 are births to mothers ages 34 and younger, and 521,829 are births to mothers ages 35 and older.

Figure 2: Living with Father and Subsequent Births (No-Testing Sample)



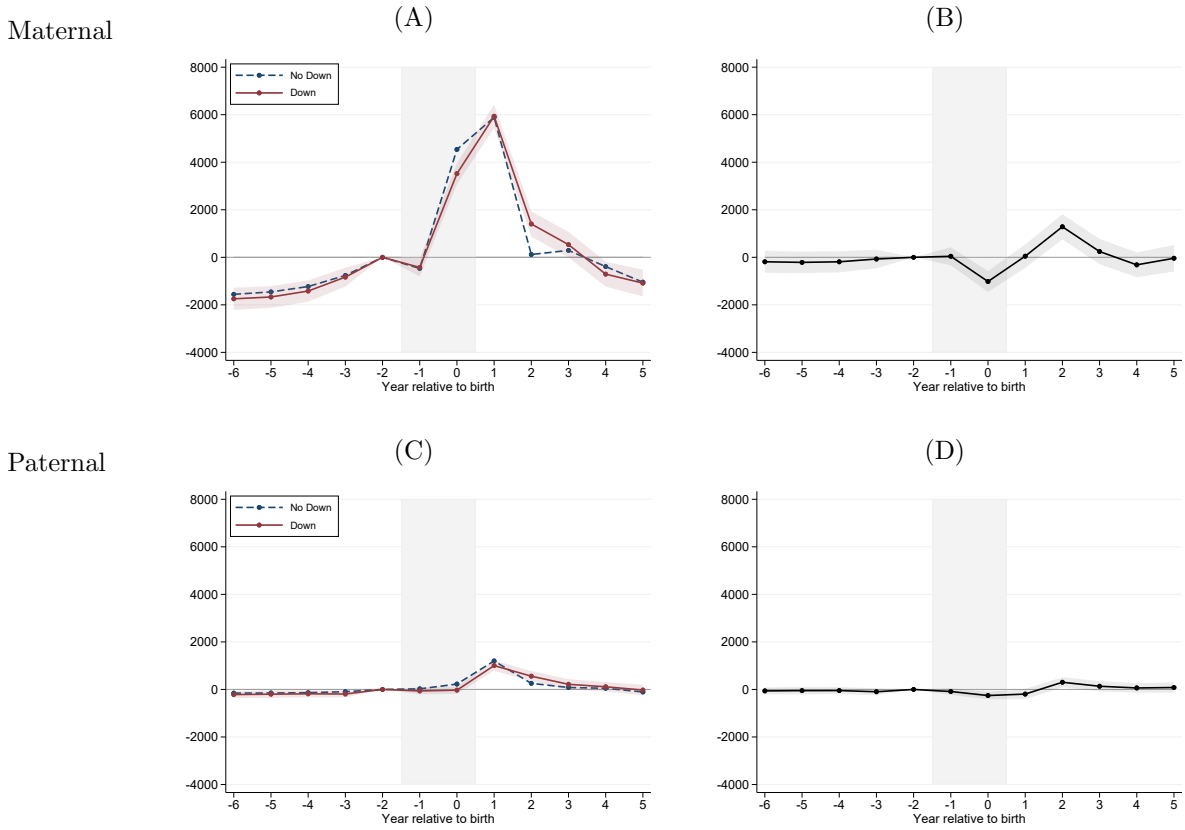
Note: Left column shows estimates of γ_r^j from equation (3) for Down and No-Down births separately; right column shows estimates of θ_r from equation (4) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 928$ Down and $N = 1,275,465$ No-Down births.

Figure 3: Maternal Economic Outcomes (No-Testing Sample)



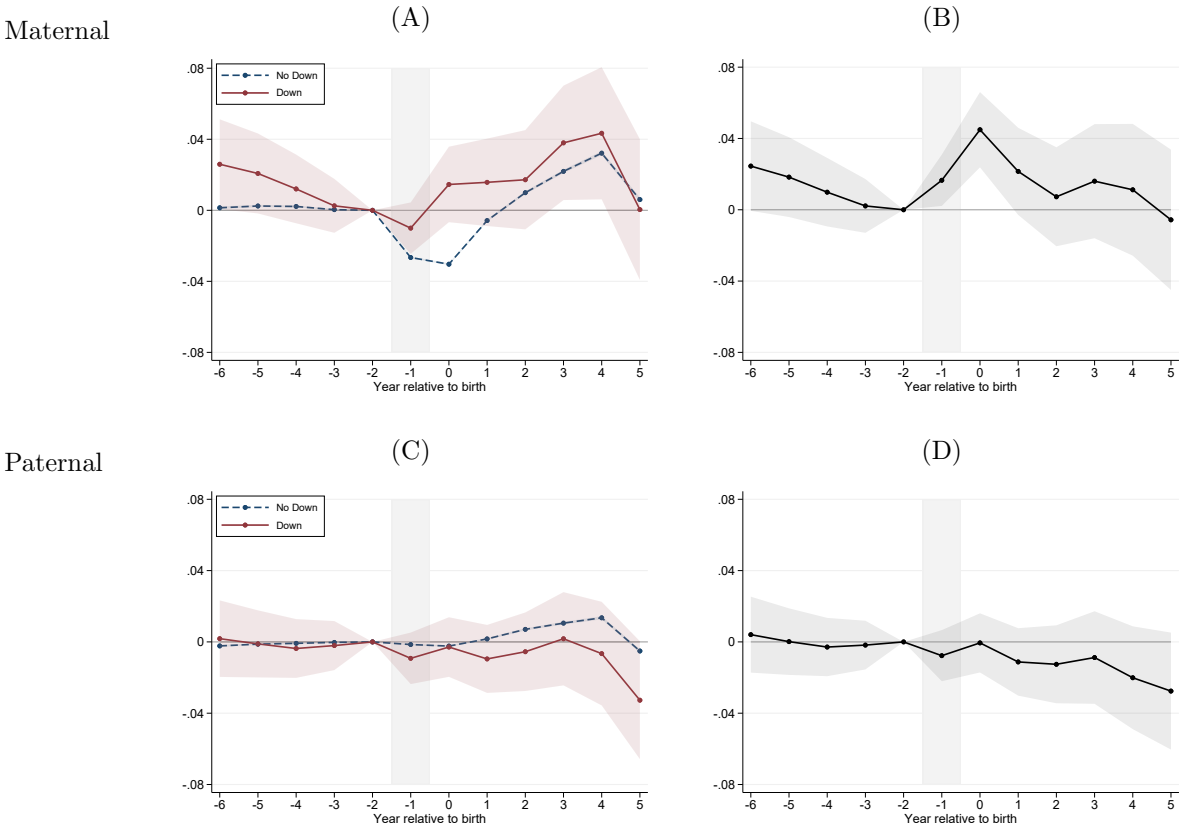
Note: See Figure 2. All income levels are measured in 2018 USD.

Figure 4: Parental Leave Income (No-Testing Sample)



Note: Left column shows estimates of γ_r^j from equation (3) for Down and No-Down births separately; right column shows estimates of θ_r from equation (4) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the parent level) shaded around the estimates. The outcome is the amount of income (measured in 2018 USD) from parental leave received in the year. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 928$ Down and $N = 1,275,465$ No-Down births.

Figure 5: Parental Drug Fills for Anxiety/Depression (Prevalent-Testing Sample)



Note: Left column shows estimates of γ_r^j from equation (3) for Down and No-Down births separately; right column shows estimates of θ_r from equation (4) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the parent level) shaded around the estimates. The outcome is an indicator for filling any drug in the given year for anxiety or depression (ATC codes starting with "N05" or "N06", respectively). Relative years since birth are defined using both the calendar year and month of birth, such that "year 0" is the set of 12 months following (and including) the child's month of birth. The sample is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later. For mothers (panels A, B), the sample consists of $N = 1,241$ Down and $N = 1,368,623$ No-Down births; for fathers (panels C, D), the sample consists of $N = 1,232$ Down and $N = 1,359,233$ No-Down births.

Table 1: Maternal Descriptive Statistics Across Samples

	Panel A: No-Testing Sample				Panel B: Prevalent-Testing Sample			
	Down	No Down*	Difference		Down	No Down*	Difference	
Maternal age in birth year	29.36	28.23	1.14	(0.14)	33.98	30.93	3.05	(0.16)
Birth parity								
First-born	0.40	0.42	-0.02	(0.02)	0.32	0.35	-0.03	(0.01)
Second-born	0.39	0.39	0.01	(0.02)	0.39	0.38	0.00	(0.01)
Third-born and higher	0.21	0.19	0.01	(0.02)	0.30	0.27	0.03	(0.01)
Maternal characteristics two years prior to birth year								
Income and earnings								
Earnings (thousands of 2018 USD)	14.72	14.93	-0.21	(0.45)	19.41	23.28	-3.88	(0.52)
Any earnings	0.86	0.87	-0.01	(0.01)	0.81	0.86	-0.05	(0.01)
Total income (thousands of 2018 USD)	19.09	19.49	-0.40	(0.41)	23.52	27.84	-4.32	(0.54)
Living together	0.54	0.54	0.00	(0.02)	0.66	0.66	0.00	(0.01)
Marital status								
Never married	0.61	0.62	-0.01	(0.02)	0.48	0.55	-0.07	(0.02)
Married	0.35	0.35	0.01	(0.02)	0.45	0.39	0.06	(0.02)
Divorced	0.04	0.03	0.01	(0.01)	0.07	0.06	0.01	(0.01)
Education								
No college	0.66	0.65	0.01	(0.02)	0.47	0.43	0.04	(0.02)
Some college	0.15	0.16	-0.01	(0.01)	0.14	0.14	0.00	(0.01)
Full college	0.17	0.17	0.00	(0.01)	0.36	0.41	-0.05	(0.01)
F-stat			0.39				7.97	
(Prob $\geq$ F)			(0.95)				(0.00)	
Number of births	928	1,275,465			1,241	1,368,623		

Notes: Table reports maternal summary statistics for the samples of Down births and births without Down. All maternal statistics other than age are reported for two years prior to the year of birth (relative year -2). Panel A is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and Panel B is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later. In each panel, we report mean characteristics for births with and without Down syndrome respectively, and the "Difference" column reports the estimate and standard error of β from the bivariate regression $Y_i = \alpha + \beta \text{Down}_i + \epsilon_i$, where Y_i is the characteristic given in the row title and Down_i is an indicator for a Down birth. The final two rows present the F-statistic and p-value from the multivariate regression $\text{Down}_i = \alpha + \beta \boldsymbol{X}_i + \epsilon$, where $\boldsymbol{X}_i$ is the vector of maternal characteristics in rows 2-14. Standard errors are clustered at the mother level in all regressions. Maternal age and birth parity are available for all births; all other maternal characteristics, because they are measured in relative year -2, are only avalble for 81% of births in Panel A and 95% of births in Panel B. In addition, 2.6% of births are missing education.

* In all rows below "Maternal age", summary statistics for the No Down sample are reweighted to match the age distribution of the Down sample, and these same weights are applied to the regressions.

Table 2: Average Birth Effects (No-Testing Sample)

	Yr -2 mean	Yr 5 No-Down effect	Yr 5 incremental Down effect
	(1)	(2)	(3)
A. Relationships and Subsequent Births*			
Living with the father	0.507	0.225	0.086
		(0.001)	(0.028)
Subsequent births: all orders	0	0.587	0.150
		(0.001)	(0.034)
Subsequent births: first-born	0	0.824	0.140
		(0.001)	(0.050)
Subsequent births: second-born	0	0.345	0.265
		(0.001)	(0.053)
Subsequent births: third+	0	0.360	0.020
		(0.003)	(0.087)
B. Maternal Economic Outcomes (2018 USD)+			
Earnings	14,133	-6,447	-2,055
		(17.17)	(590)
Any earnings	0.867	-0.105	-0.027
		(0.001)	(0.018)
Total income	18,611	-5,864	7,671
		(43.93)	(575)
Care allowance	41.048	126	9,771
		(1.70)	(206)

Notes: Table reports averages of γ_r^j in equation (3) or (1) in column (2) for no-Down births, and averages of θ_r in equation (4) or (2) in column (3). Standard errors (clustered at the mother level) are reported in parentheses. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 928$ Down and $N = 1,275,465$ no-Down births.

*The reported "Yr 5 effect" is the estimate in relative year 5.
+The reported "Yr 5 effect" is the average effect over relative years 1-5.

Table 3: Average Birth Effects Across Samples

	No-Testing Sample		Prevalent-Testing Sample		Prevalent-Testing, Age $\leq$ 34 Sample	
	Yr -2 mean	Yr 5 incremental Down effect	Yr -2 mean	Yr 5 incremental Down effect	Yr -2 mean	Yr 5 incremental Down effect
	(1)	(2)	(3)	(4)	(5)	(6)
A. Relationships and Subsequent Births*						
Living with the father	0.507	0.086	0.622	0.060	0.59	0.037
		(0.028)		(0.024)		(0.040)
Subsequent births: all orders	0	0.150	0	0.051	0	0.112
		(0.034)		(0.025)		(0.045)
Subsequent births: first-born	0	0.140	0	0.006	0	0.049
		(0.050)		(0.041)		(0.059)
Subsequent births: second-born	0	0.265	0	0.223	0	0.188
		(0.053)		(0.039)		(0.072)
Subsequent births: third+	0	0.020	0	0.057	0	0.312
		(0.087)		(0.051)		(0.160)
B. Maternal Economic Outcomes (2018 USD)+						
Earnings	14,133	-2,055	20,907	2,268	19,106	1,946
		(590)		(841)		(1,045)
Any earnings	0.867	-0.027	0.854	0.048	0.849	0.014
		(0.018)		(0.018)		(0.029)
Total income	18,611	7,671	25,157	12,586	23,107	12,078
		(575)		(884)		(1,130)
Care allowance	41.05	9,771	54.65	9,895	30.79	9,962
		(206)		(170)		(266)
C. Paternal Economic Outcomes (2018 USD)+						
Earnings	25,102	-62.352	34,848	1,154	32,580	3,066
		(964)		(1,262)		(1,295)
Any earnings	0.909	-0.010	0.912	0.028	0.910	0.023
		(0.013)		(0.013)		(0.018)
Total income	27,266	1,328	38,001	3,393	35,282	5,316
		(922)		(1,379)		(1,380)
Care allowance	3.97	606	10.00	1,039	6.70	948
		(80)		(103)		(132)

Notes: Table reports pre-period means along with averages of θ_r in equation (4) or (2). Columns (1)-(2) contain results for the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger; columns (3)-(4) contain results for the Prevalent-Testing sample, i.e. births in 2006 and later; and columns (5)-(6) contain results for the Prevalent-Testing, Age $\leq$ 34 sample, i.e. births in 2006 and later born to mothers ages 34 and younger. Standard errors clustered at the parent level are reported in parentheses below each estimate. The sample in columns (1)-(2) contains $N = 928$ Down and $N = 1,275,465$ No-Down births for mothers, and $N = 924$ Down and $N = 1,266,684$ No-Down births for fathers; in columns (3)-(4) contains $N = 1,241$ Down and $N = 1,368,623$ No-Down births for mothers and $N = 1,232$ Down and $N = 1,359,233$ No-Down births for fathers; and in columns (5)-(6) contains $N = 644$ Down and $N = 1,034,709$ No-Down births for mothers and $N = 638$ Down and $N = 1,026,109$ No-Down births for fathers.

*The reported "Yr 5 effect" is the estimate in relative year 5.

+The reported "Yr 5 effect" is the average effect over relative years 1-5.

Online Appendix

A Expert Survey

We designed and ran a survey of economists to determine their priors on the effect of an unexpected Down syndrome birth (relative to the birth of a child with no chromosomal abnormalities) on family structure, subsequent childbearing, and maternal labor market outcomes.

The survey was sent to NBER affiliates in the Economics of Health and Children and Families programs. Anonymous survey responses were collected with Stanford IRB approval. We received 143 responses in total.

Design. Our survey first asked respondents to share their professional role (from the list "faculty or post-doc", "researcher outside of academia", and "other") and their gender. We then asked three key questions in multiple-choice format (each with three choices). First, we elicited predictions about whether unexpectedly having a child with Down syndrome increases, decreases, or has no differential effect on a couple's likelihood of remaining together within five years, compared to if the same couple had a child without chromosomal abnormalities. Next, we asked whether unexpectedly having a child with Down syndrome increases, decreases, or leaves unchanged the number of subsequent children the mother gives birth to within the next five years, compared to if the same mother had a child without chromosomal abnormalities. Finally, we provided the information that a large body of research across many countries has documented that the (first) birth of a child decreases maternal labor market earnings, and we asked whether unexpectedly having a child with Down syndrome would lead to an even larger decline, a smaller decline, or a roughly similar decline.

Analysis Sample. Of the 143 responses that we received, we dropped 1 response for which the three key questions were left unanswered. Our analysis sample contains the remaining 142 responses.

Summary statistics. In our analysis sample, 98% of respondents identified as faculty or post-docs, and 1% identified as each of "other" (further described as either "emeritus faculty" or "retired faculty") and "researcher outside of academia". Among the 124 respondents who reported their gender, 65% are male and 35% female.

Results. Figures A1 and A2 summarize the responses to our survey for the full sample of respondents and separately by gender, respectively.

B Data and variable construction

B.1 Variable definitions

Chromosomal abnormalities. We use the diagnosis codes in the Medical Birth Records, which capture diagnoses recorded at birth. In the beginning of our study period, the data records ICD-9 codes, and in subsequent years the data records ICD-10 codes (different regions switch coding at slightly different times).

We code a child as having Down syndrome if any of the child's diagnosis codes in the MBR begins with "Q90" (ICD-10) or begins with "7580", "758A", or "758.0" (ICD-9). We code a child as having a different chromosomal abnormality if any of the child's diagnosis codes begins with "Q9" (ICD-10) or begins with "758" or "72H" (ICD-9), but the child's diagnosis codes do *not* indicate Down syndrome.

We code a child as having no chromosomal abnormality otherwise.

Maternal age at birth. We observe maternal year of birth in the data from Statistics Sweden, and the child's date of birth in the birth records. We define maternal age at birth as the difference between the child's year of birth and the mother's year of birth.

Mother living with the father. Our outcome variable for whether the mother is living with the father is defined in terms of co-residence (rather than marital status, although couples who are married often live together). Co-residence information comes from the LISA panel from 1991 through 1999, and from the Total Population Register thereafter.

For the years 1991-2010, our data includes information about a woman's co-residing partner, defined as follows: (i) if she is married and lives at the same address as her spouse, then her spouse is the co-residing partner; (ii) if she is not married but lives at the same address as a man with whom she has at least one joint child, then this man is the co-residing partner; and (iii) if she is in a registered same-sex partnership (relevant in Sweden prior to 2009, when same-sex marriage was legalized), then the same-sex partner is the co-residing partner.

For the years 2011 through 2019 we are able to also capture unmarried co-residing (i.e., cohabiting) partners who do not have any joint child.

Given these partner identifiers, we define an indicator for whether the mother is living together with the father of the child that takes the value of one if the mother has a non-missing partner *and* the partner's identifier matches the identifier of the father of the child, and the value of zero otherwise.

We separately identify marital status using the civil status codes provided directly in the 1990-2019 LISA records.

Invasive testing. For births in 1995 and later, the MBR data contain indicators for whether the mother of each birth underwent either amniocentesis or chorionic villus sampling. We define our "invasive testing" indicator to take the value 1 if the mother underwent either of these tests and 0 otherwise.

Birth parity. We obtain infromation about birth parity directly from the Total Population Register.

Maternal (or paternal) total income. Total income is measured at the individual level and defined as the sum of the following components, all of which are obtained from the 1990-2019 LISA panel and converted from SEK to 2018 USD using exchange rates and inflation rates published by Sveriges Riksbank and Statistics Sweden (Sveriges Riksbank 2025 and Statistics Sweden 2025, respectively):

- **Work income:** We construct this measure as the sum of individual income from employment and individual income from self-employment in each year.
- **Unemployment insurance:** We construct this measure as the sum of the two components of income provided during unemployment: the component due to individual unemployment and the component given via labor market policy measures: unemployment insurance payouts and transfers to unemployed individuals in programs aimed at enhancing their employability.
- **Parental leave:** The amount of parental leave income received by each parent in each year is directly observed in the LISA panel.
- **Study income:** All study-related income is observed directly in the LISA panel.
- **Capital income:** Income from capital is observed directly in the LISA panel.
- **Care allowance:** Prior to 2019, parents of children with a disability that required special supervision and care for a period of at least six months were eligible for a transfer entitled *Vårdbidrag* until June of the year the child turns 19. Only one parent could apply for, and be awarded, the care allowance. However, upon award, the couple could choose to have the Social Insurance Agency pay a portion of the payment to the mother and a portion to the father. In the LISA data, we observe the individual amounts of Vårdbidrag paid to each parent, by calendar year, which we use as our outcome. In 2019, the last year of our data, parents could no longer apply for Vårdbidrag, but instead for two new transfer programs servicing parents of disabled children, entitled *Omvårdnadsbidrag* and *Merkostnadsbidrag*. The eligibility rules changed, and now both parents could apply for, and be awarded, such transfers. In the LISA data, we observe the individual amounts of Omvårdnadsbidrag and Merkostnadsbidrag in 2019. Some parents who had been awarded Vårdbidrag prior to 2019 also kept these transfers in 2019. Thus, in 2019 we define care allowance as the sum of Vårdbidrag, Omvårdnadsbidrag, and Merkostnadsbidrag.[37]
- **Other taxable work-related income:** While parental leave is the most important work-related benefit for many of the families we study, there are also other taxable benefits that are linked to employment or self-employment, such as compensation for temporary sick leave, which we include in this "other" category. In addition, this category includes income from "passive ownership."

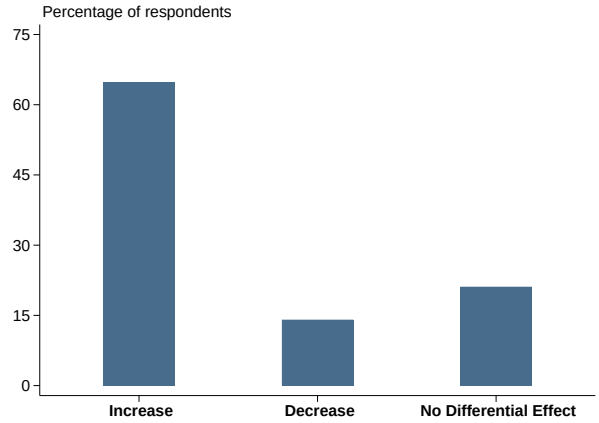
[37] See Inspektionen för Socialförsäkringen 2021 for more information about the care allowance and reform.

Maternal (or paternal) prescription drug fills for anxiety or depression. We construct indicators in the maternal (paternal) panel that take the value 1 if the mother (father) filled any drug for anxiety or depression in the year. Drug fill dates are obtained from the National Board of Health and Welfare. We define anxiety and depression drugs as those with ATC codes whose first three digits are "N05" and "N06", respectively.

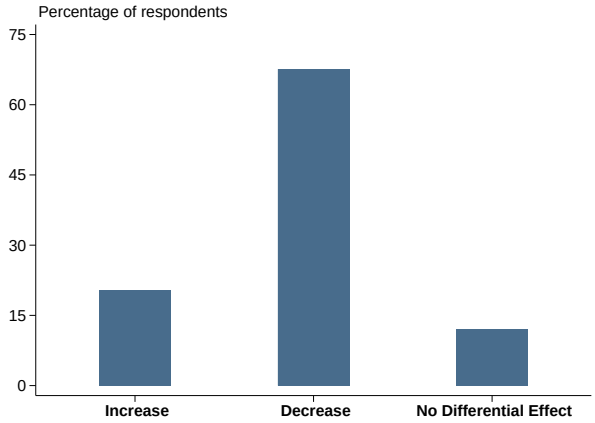
Child mortality. In our data from Statistics Sweden, we observe the date of death for any individual who has an individual identifier (i.e., who was ever assigned a social security number in Sweden) and who died through the end of 2019. Using the combination of birth and death dates, we define indicators for whether the child died within one or five years of birth.

Appendix Figure A1: Expert Survey Results: Predicted Effect of an Unexpected Down Birth

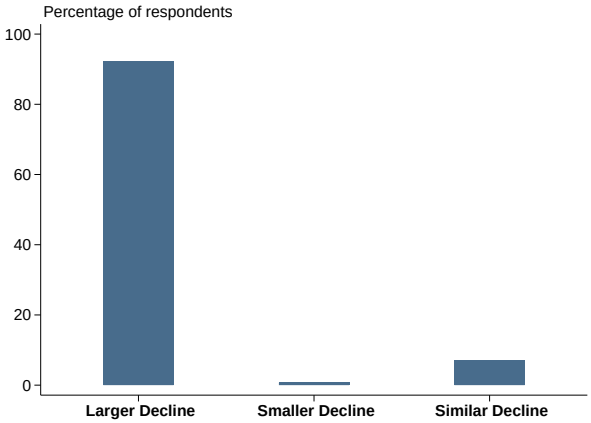
A. Likelihood of Separation/Divorce



B. Number of Subsequent Births



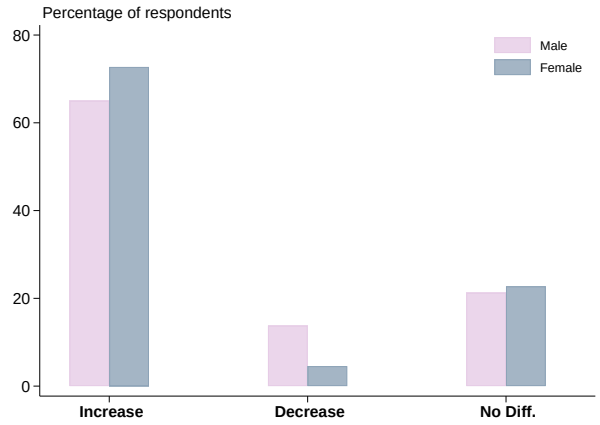
C. Decline in Maternal Earnings



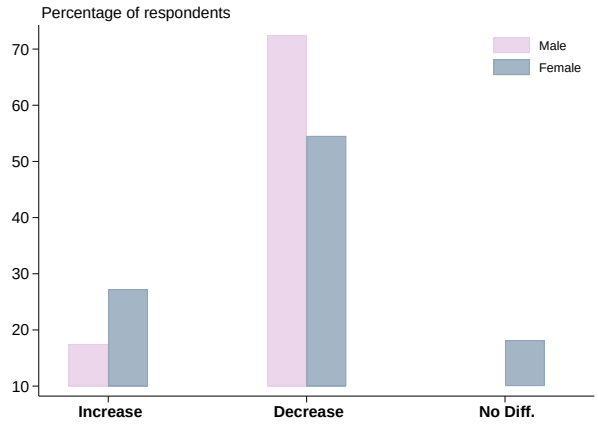
Note: Figure shows results from our expert survey. Panel (A) summarizes responses to a question about the predicted effect of an unexpected Down birth (relative to a birth with no chromosomal abnormalities) on the likelihood of separation/divorce within five years. Panel (B) summarizes responses to a question about the predicted effect of an unexpected Down birth (relative to a birth with no chromosomal abnormalities) on the mother's number of subsequent children. Panel (C) summarizes responses to a question about the predicted effect of an unexpected Down birth (relative to a birth with no chromosomal abnormalities) on the decline in maternal earnings. The analysis sample is 142 respondents.

Appendix Figure A2: Expert Survey Results by Gender: Predicted Effect of an Unexpected Down Birth

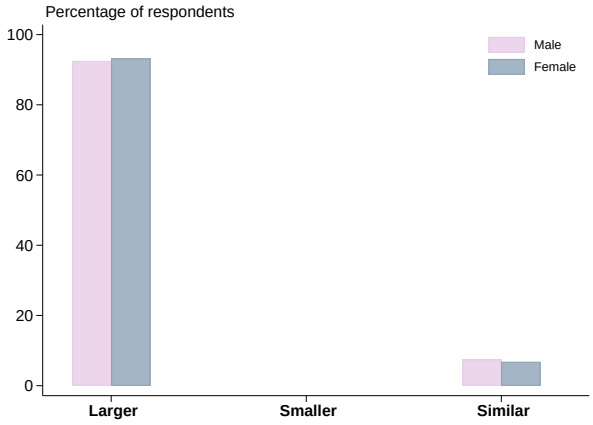
A. Likelihood of Separation/Divorce



B. Number of Subsequent Births

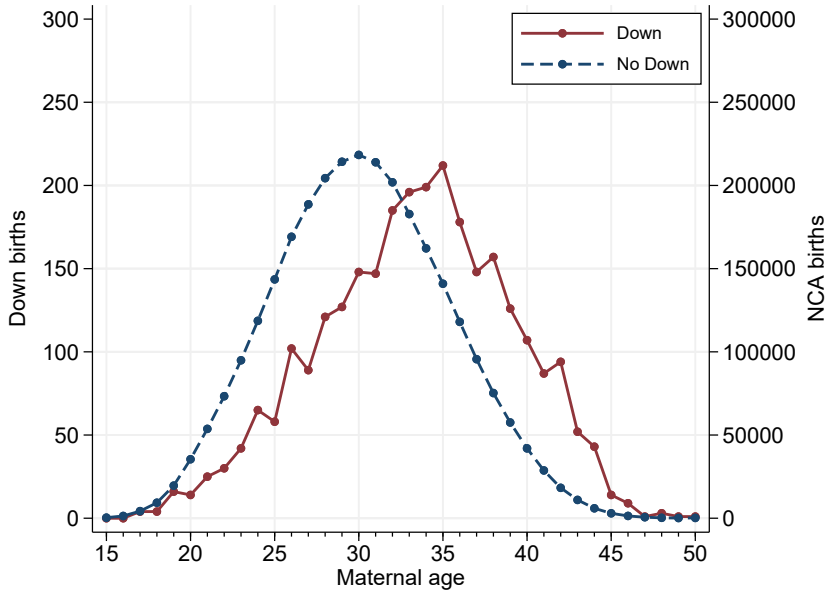


C. Decline in Maternal Earnings



Note: Figure shows results from our expert survey, by gender of the respondent. Panel (A) summarizes responses to a question about the predicted effect of an unexpected Down birth (relative to a birth with no chromosomal abnormalities) on the likelihood of separation/divorce within five years. Panel (B) summarizes responses to a question about the predicted effect of an unexpected Down birth (relative to a birth with no chromosomal abnormalities) on the mother's number of subsequent children. Panel (C) summarizes responses to a question about the predicted effect of an unexpected Down birth (relative to a birth with no chromosomal abnormalities) on the decline in maternal earnings. The analysis sample is the 124 respondents who reported their gender.

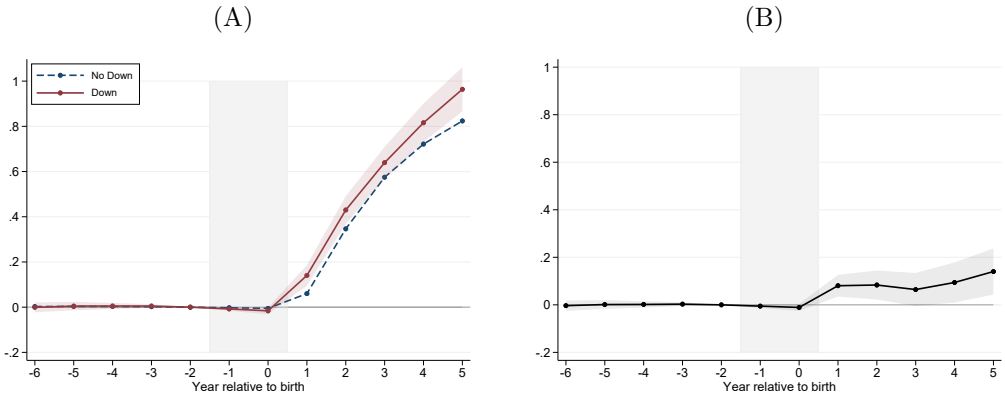
Appendix Figure A3: Down and No-Down Births by Maternal Age



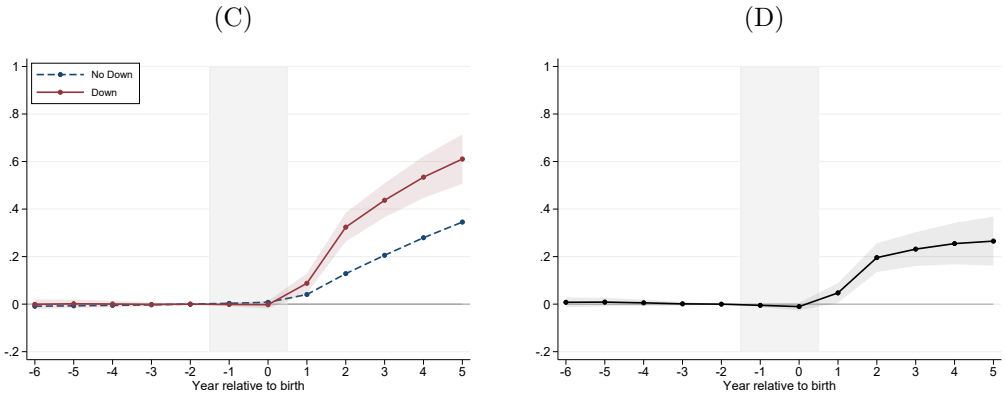
Note: Figure shows the number of Down and No-Down births by maternal age for our baseline sample, which consists of 2,805 Down and 2,909,021 No-Down births. Ages below 15 and above 50 are binned at 15 and 50, respectively.

Appendix Figure A4: Number of Subsequent Births, By Birth Order (No-Testing Sample)

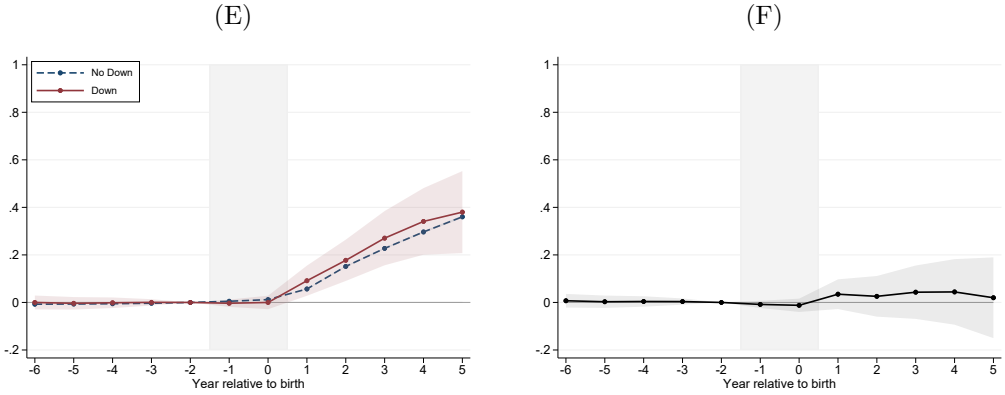
First births



Second births

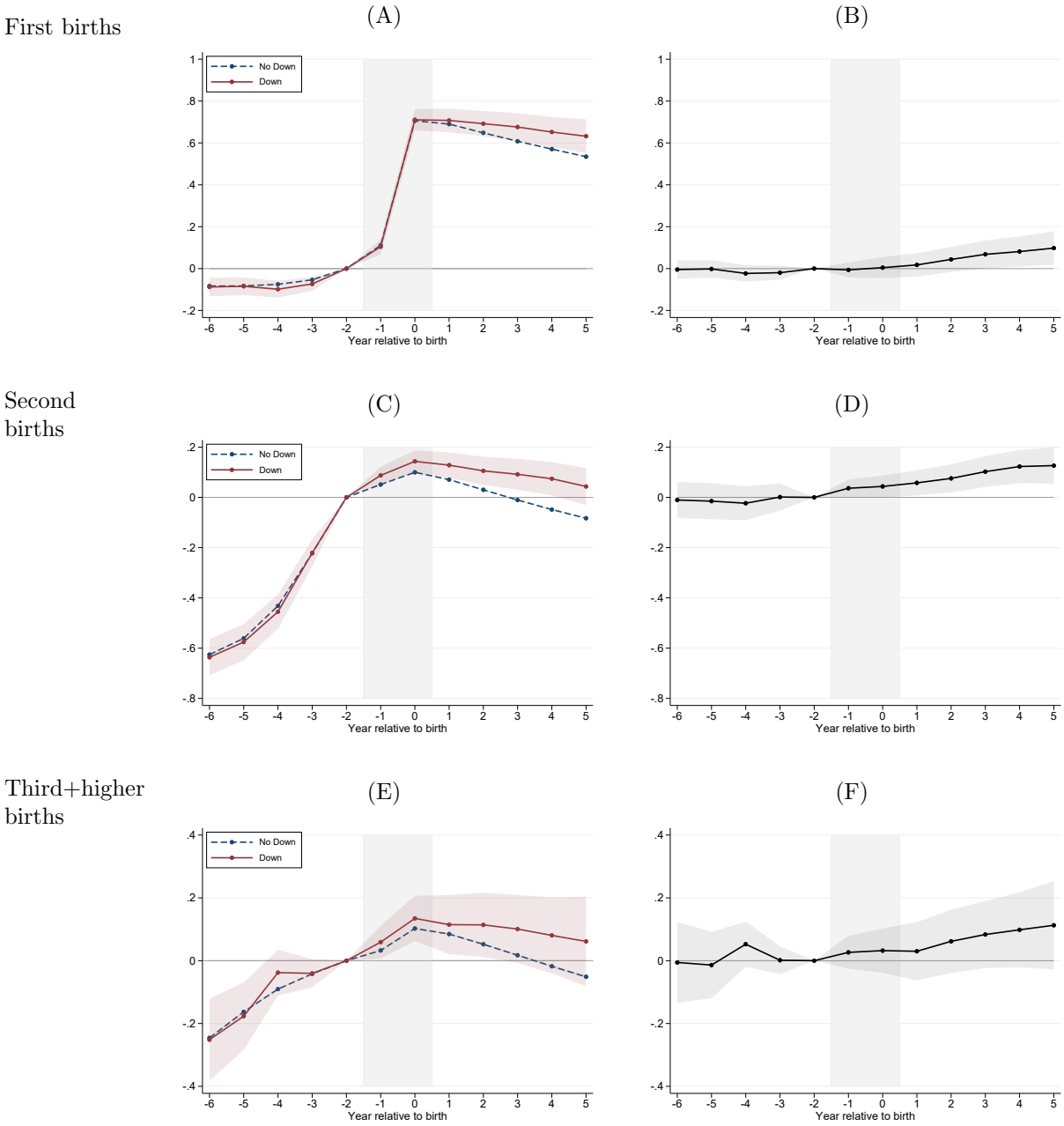


Third+higher births



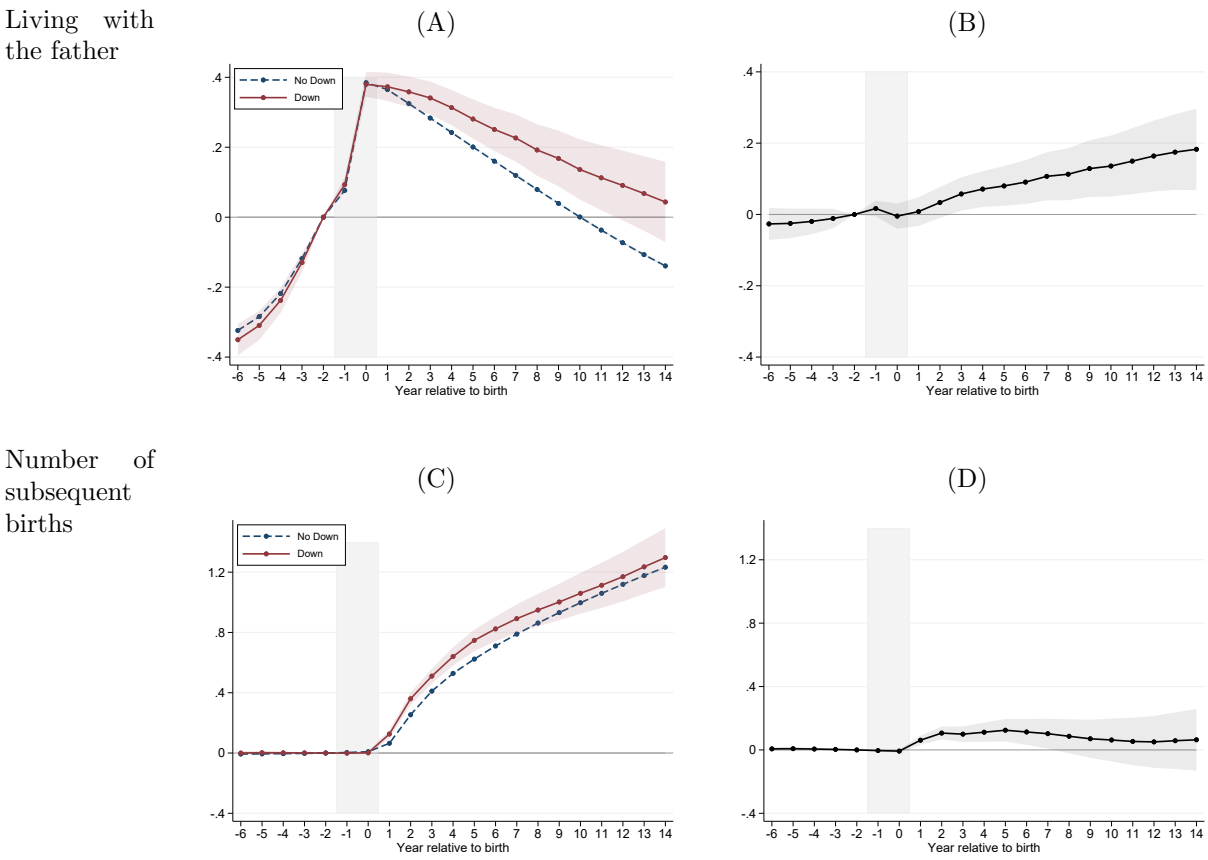
Note: Left column shows estimates of γ_r^j from equation (1) for Down and No-Down births separately; right column shows estimates of θ_r from equation (2) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. The outcome is the cumulative count of the mother's subsequent births after the focal birth. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger. The sample of first births consists of $N = 367$ Down and $N = 593,279$ No-Down births; the sample of second births consists of $N = 371$ Down and $N = 470,663$ No-Down; and the sample of third and higher order births consists of $N = 190$ Down and $N = 211,523$ No-Down.

Appendix Figure A5: Living with the Father, By Birth Order (No-Testing Sample)



Note: Left column shows estimates of γ_r^j from equation (1) for Down and No-Down births separately; right column shows estimates of θ_r from equation (2) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. The outcome is an indicator for living together with the father. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger. The sample of first births consists of $N = 367$ Down and $N = 593,279$ No-Down births; the sample of second births consists of $N = 371$ Down and $N = 470,663$ No-Down; and the sample of third and higher order births consists of $N = 190$ Down and $N = 211,523$ No-Down.

Appendix Figure A6: Longer-run Effects on Living with Father and Subsequent Births (No-Testing) Sample

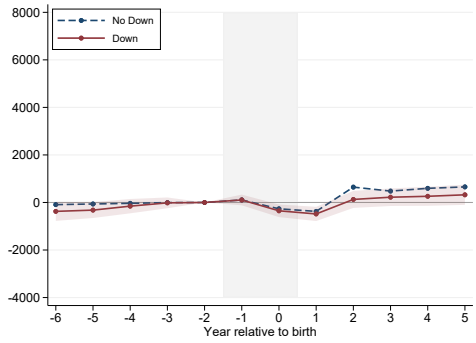


Note: Left column shows estimates of γ_r^j from equation (3) for Down and No-Down births separately; right column shows estimates of θ_r from equation (4) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. Outcomes are an indicator for whether the mother is living with the father of the child (panels A, B), and the mother's cumulative number of subsequent births after the focal birth (panels C, D). Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 928$ Down and $N = 1,275,465$ No-Down births.

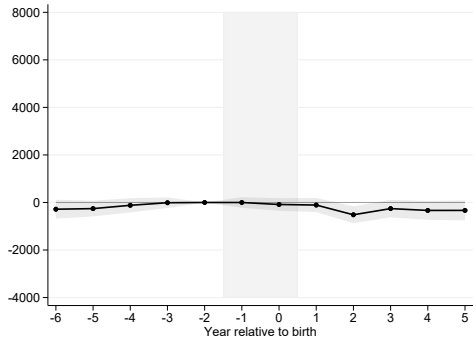
Appendix Figure A7: Other Maternal Income Components (No-Testing Sample)

Unemployment insurance

(A)

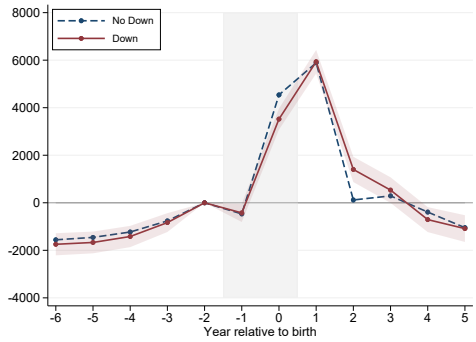


(B)

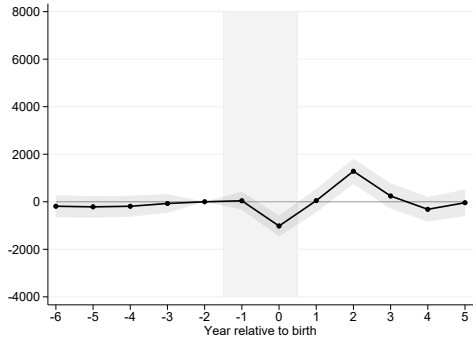


Parental leave

(C)

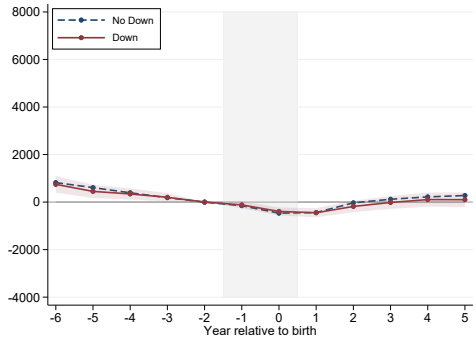


(D)

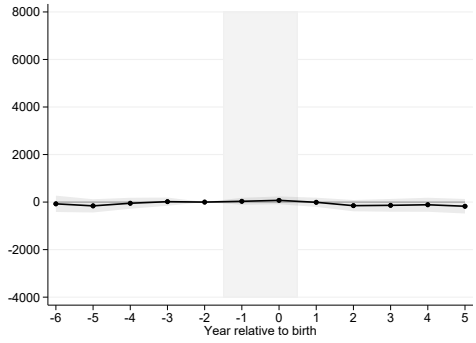


Study income

(E)



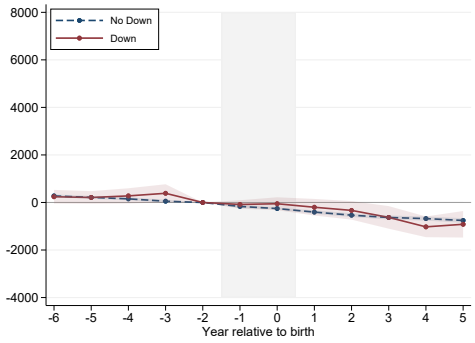
(F)



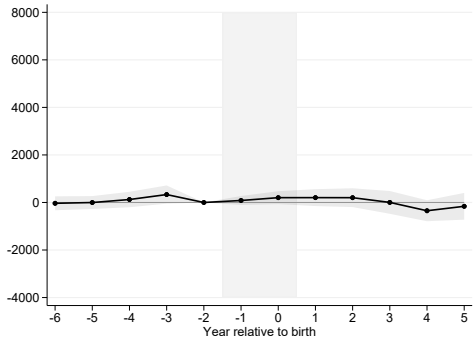
Appendix Figure A7: Other Maternal Income Components (No-Testing Sample) (continued)

Capital income

(A)

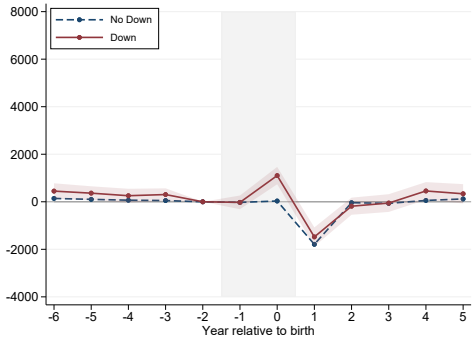


(B)

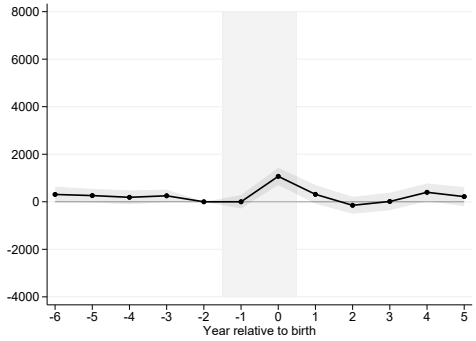


Other income

(C)

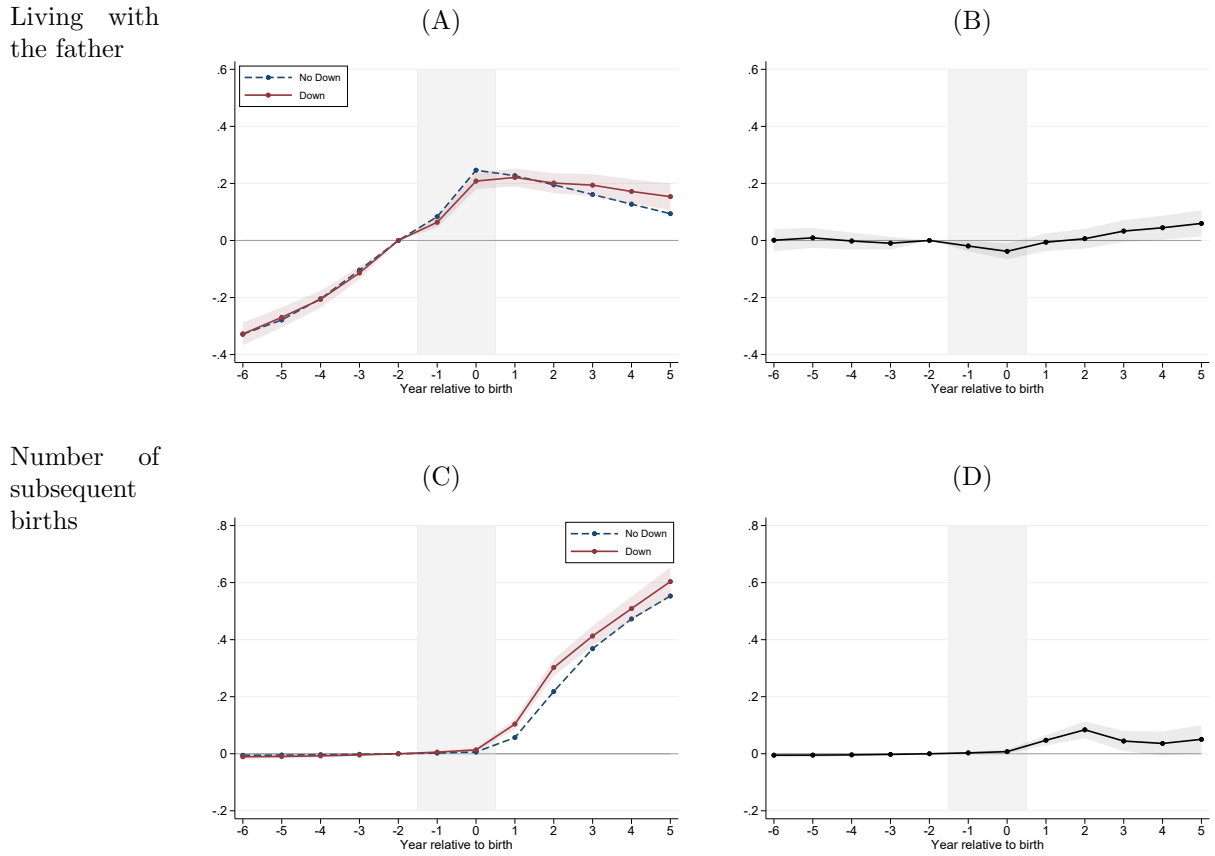


(D)



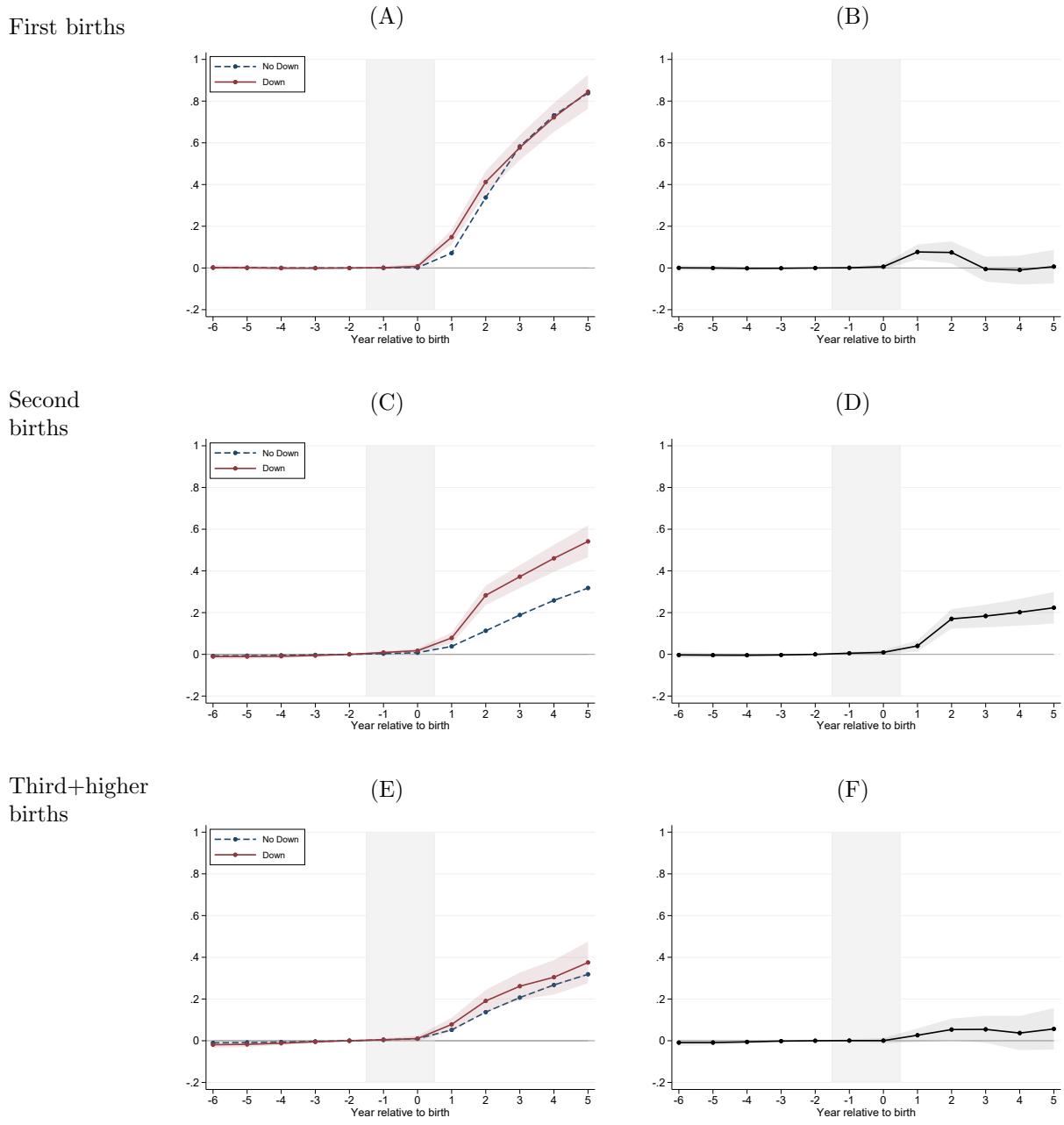
Note: See Figure 2. All income levels are measured in 2018 USD.

Appendix Figure A8: Living with Father and Subsequent Births (Prevalent-Testing Sample)



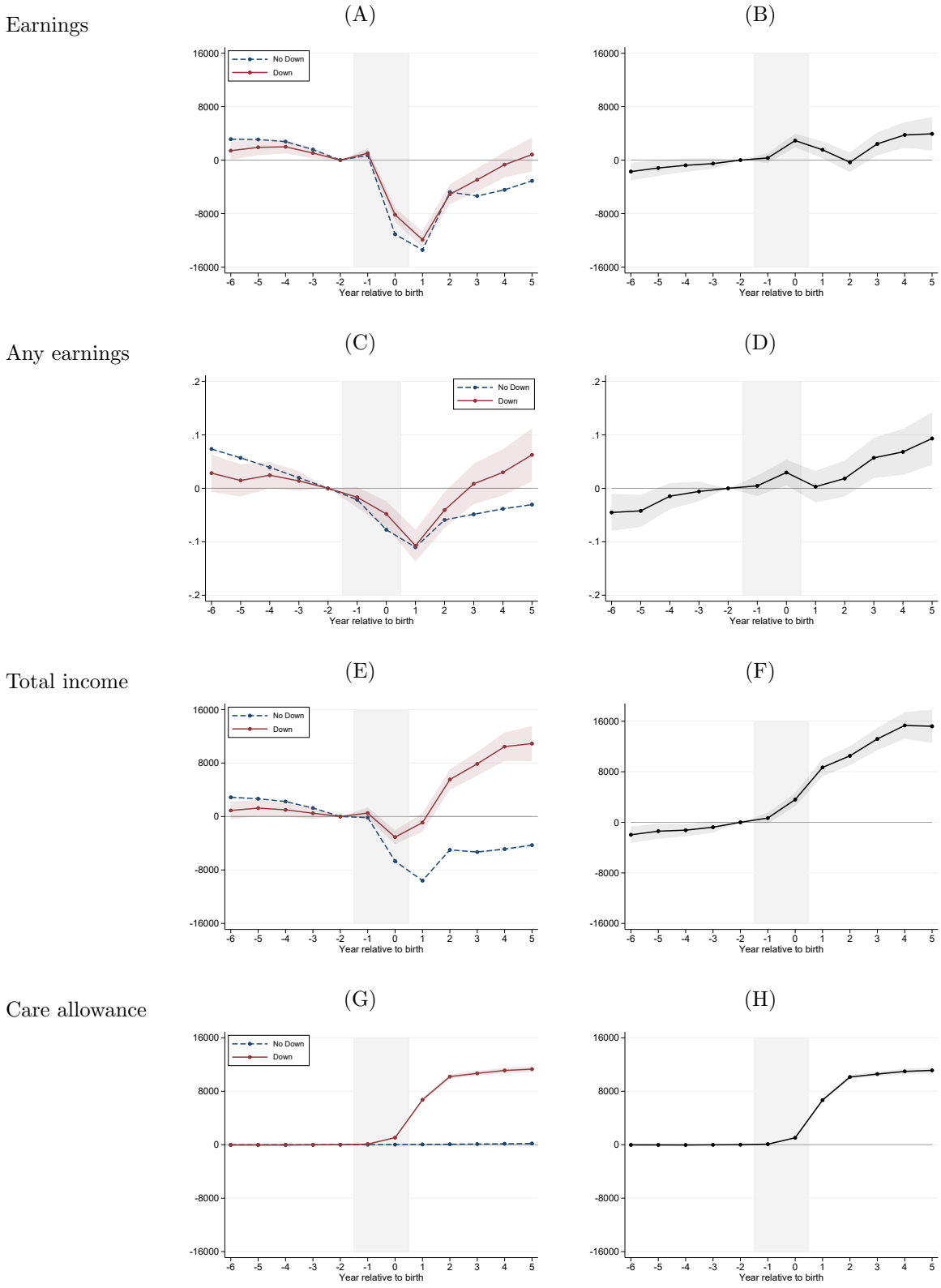
Note: Left column shows estimates of γ_r^j from equation (3) for Down and No-Down births separately; right column shows estimates of θ_r from equation (4) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later, and consists of $N = 1,241$ Down and $N = 1,368,623$ No-Down births.

Appendix Figure A9: Number of Subsequent Births, By Birth Order (Prevalent-Testing Sample)



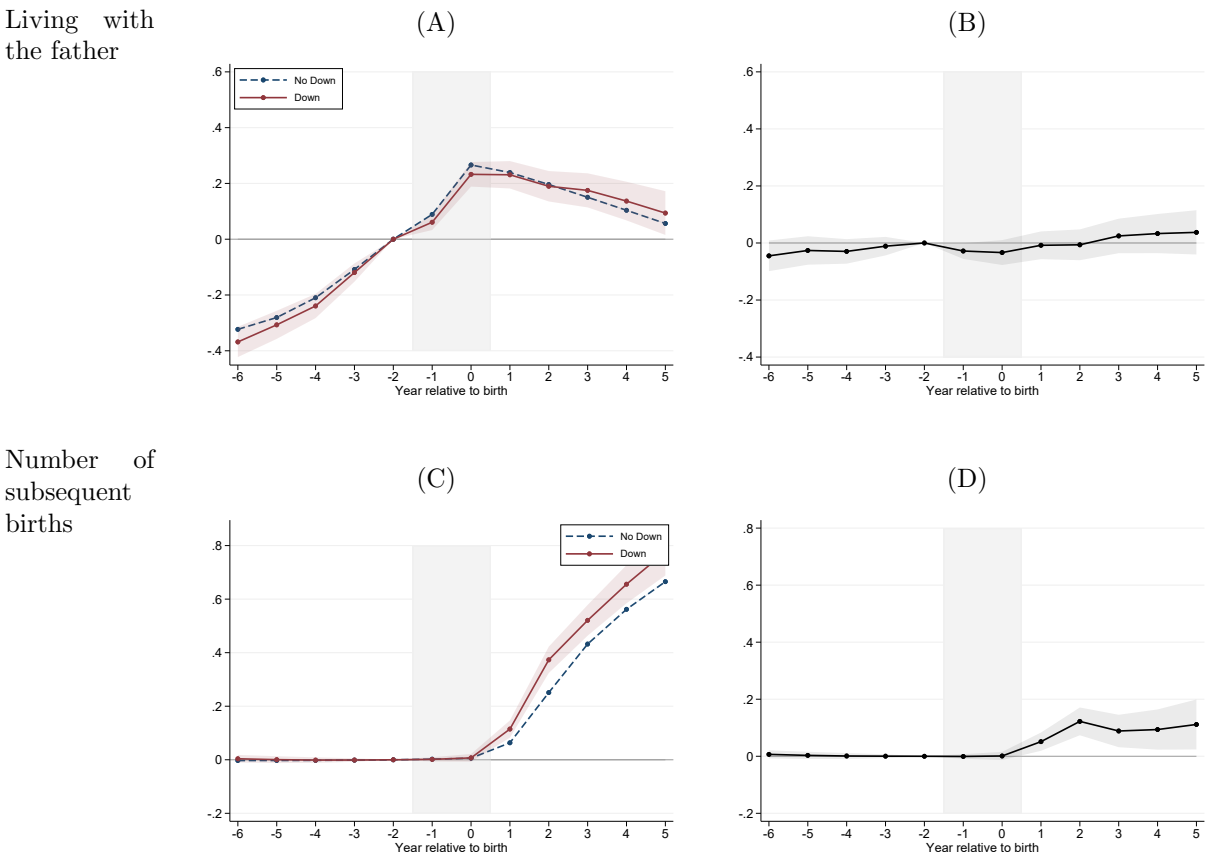
Note: Left column shows estimates of γ_r^j from equation (1) for Down and No-Down births separately; right column shows estimates of θ_r from equation (2) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. The outcome is the cumulative count of the mother's subsequent births after the focal birth. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later. The sample of first births consists of $N = 405$ Down and $N = 598,885$ No-Down births; the sample of second births consists of $N = 470$ Down and $N = 508,359$ No-Down; and the sample of third and higher order births consists of $N = 366$ Down and $N = 261,379$ No-Down.

Appendix Figure A10: Maternal Economic Outcomes (Prevalent-Testing Sample)



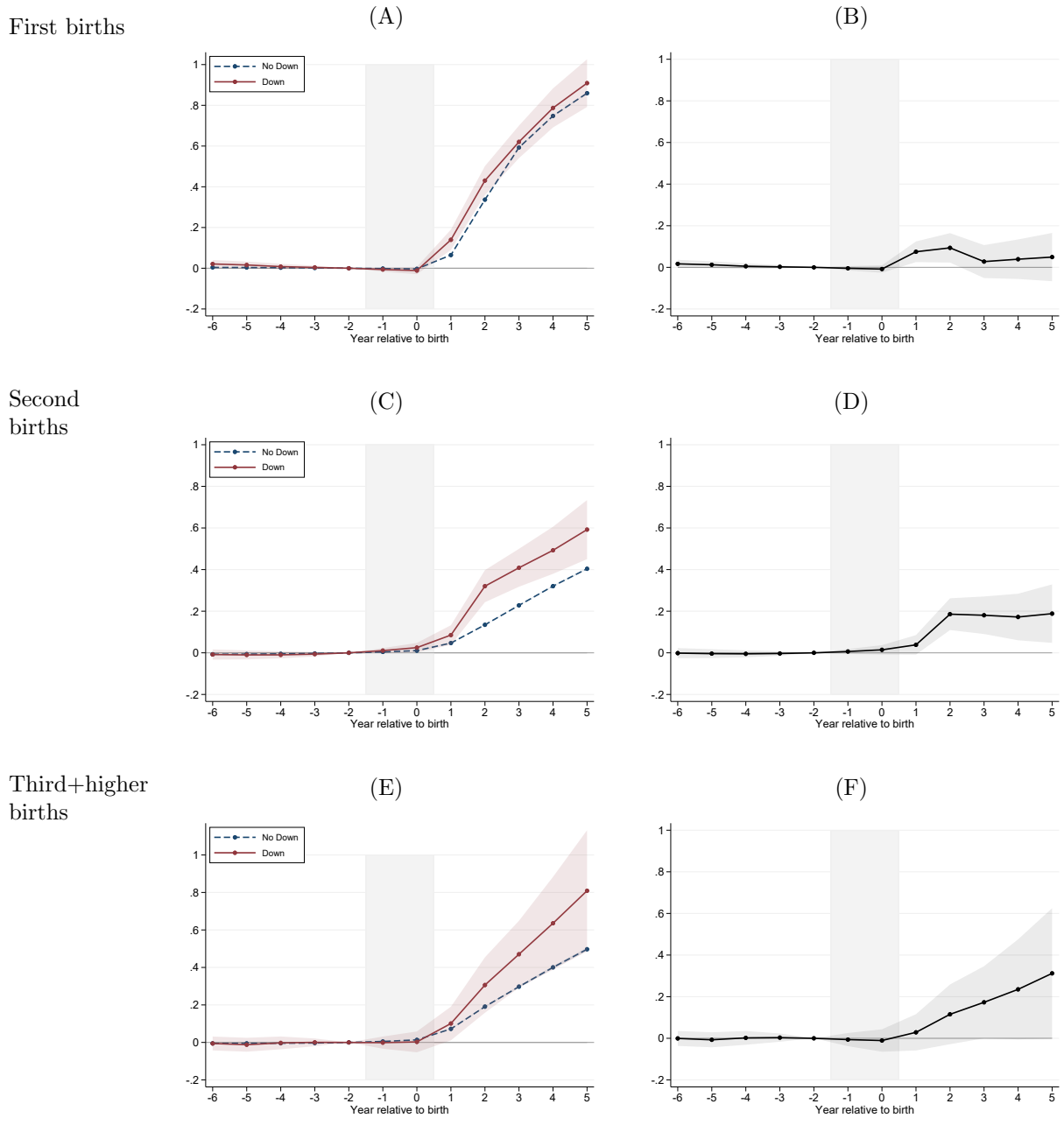
Note: See figure A8. All income levels are measured in 2018 USD.

Appendix Figure A11: Living with Father and Subsequent Births (Prevalent-Testing, Age ≤ 34 Sample)



Note: Left column shows estimates of γ_τ^j from equation (3) for Down and No-Down births separately; right column shows estimates of θ_τ from equation (4) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the Prevalent-Testing, Age ≤ 34 sample, i.e. births in 2006 and later born to mothers ages 34 and younger, and consists of $N = 644$ Down and $N = 1,034,709$ No-Down births.

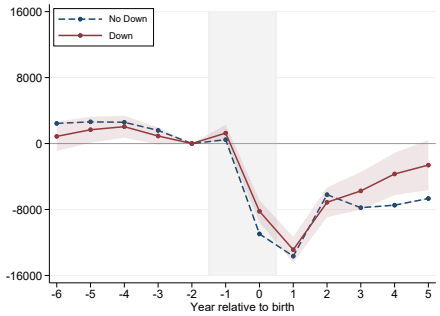
Appendix Figure A12: Number of Subsequent Births, By Birth Order (Prevalent-Testing, Age $\leq$ 34 Sample)



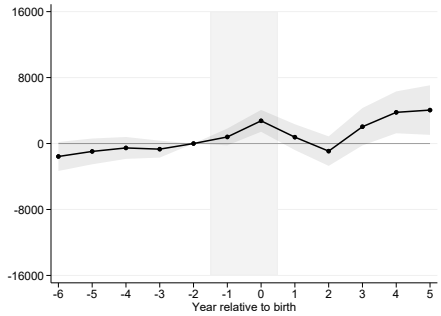
Note: Left column shows estimates of γ_r^j from equation (1) for Down and No-Down births separately; right column shows estimates of θ_r from equation (2) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. The outcome is the cumulative count of the mother's subsequent births after the focal birth. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the Prevalent-Testing, Age $\leq$ 34 sample, i.e. births in 2006 and later born to mothers ages 34 and younger. The sample of first births consists of $N = 285$ Down and $N = 517,595$ No-Down births; the sample of second births consists of $N = 261$ Down and $N = 377,008$ No-Down; and the sample of third and higher order births consists of $N = 98$ Down and $N = 140,106$ No-Down.

Appendix Figure A13: Maternal Economic Outcomes (Prevalent-Testing, Age $\leq$ 34 Sample)

Earnings

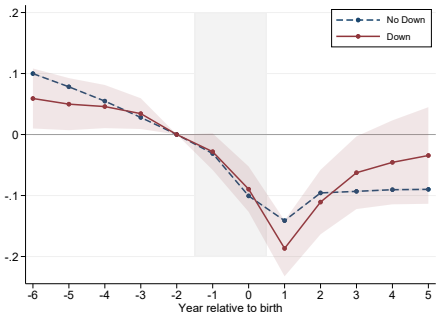


(A)

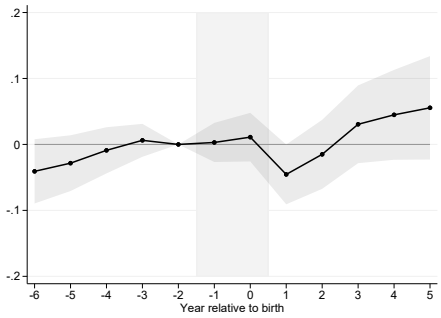


(B)

Any earnings

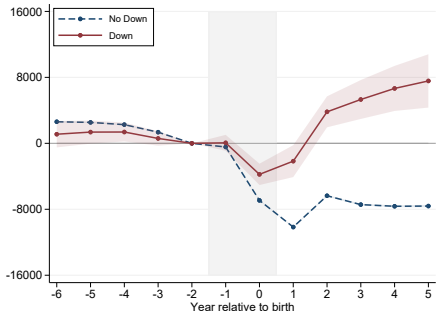


(C)

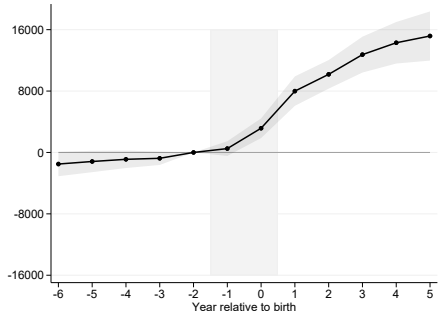


(D)

Total income

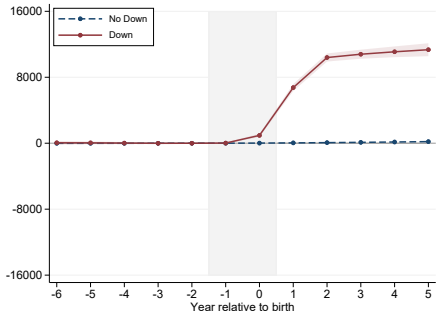


(E)

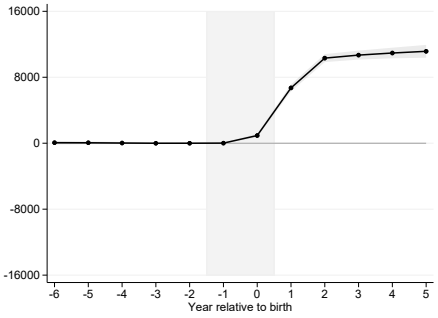


(F)

Care allowance



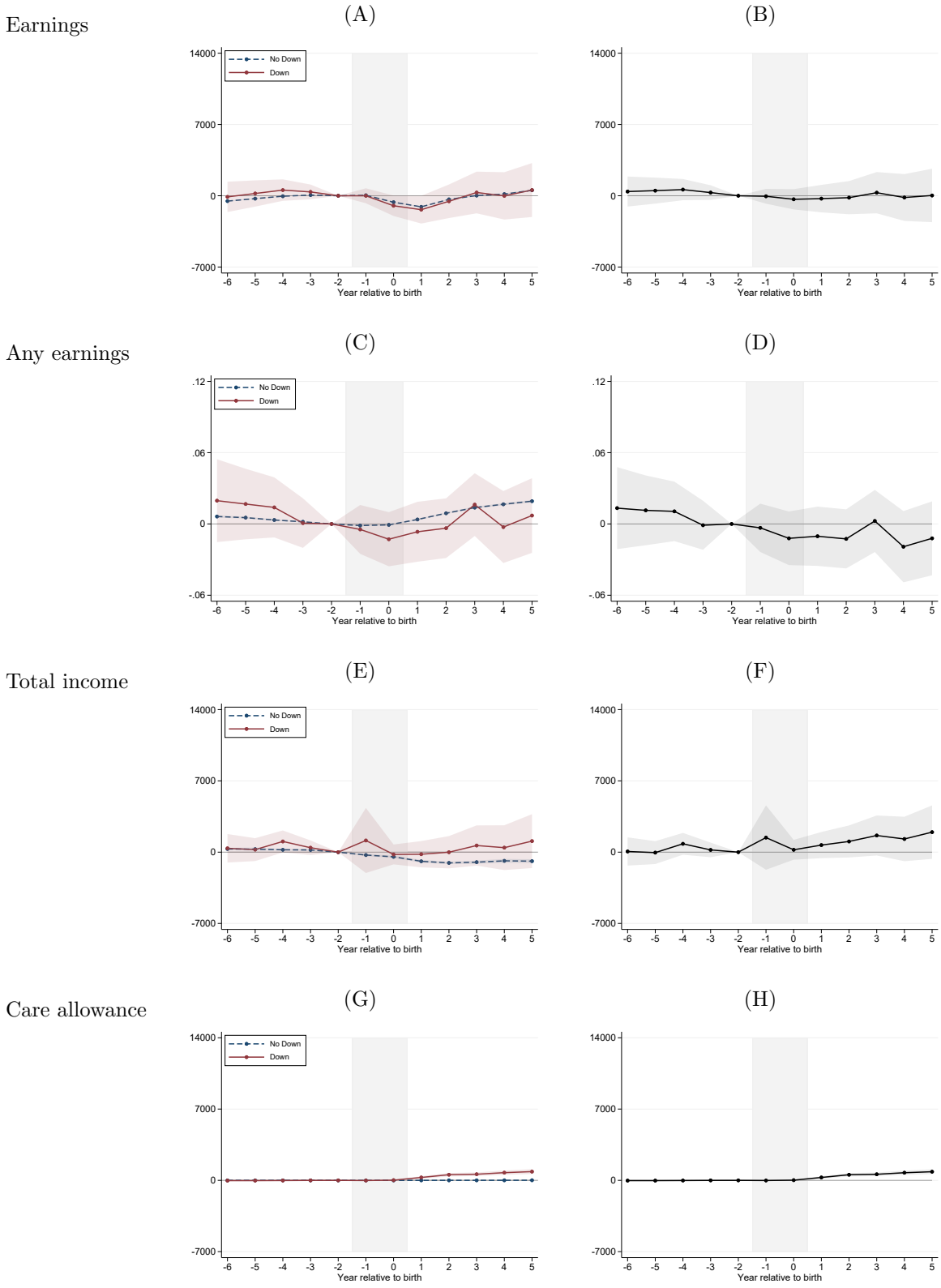
(G)



(H)

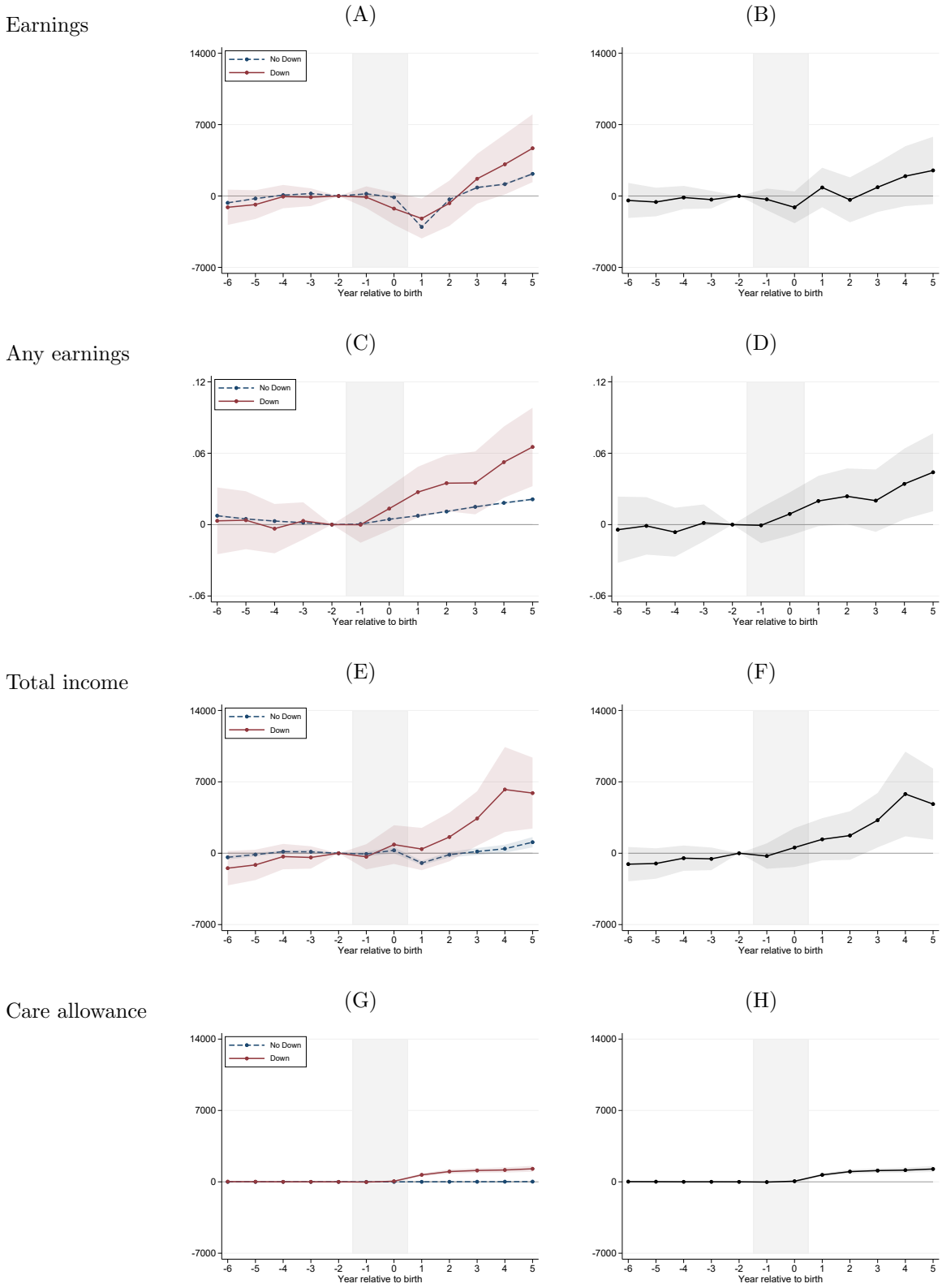
Note: See Figure A11. All income levels are measured in 2018 USD.

Appendix Figure A14: Paternal Economic Outcomes (No-Testing Sample)



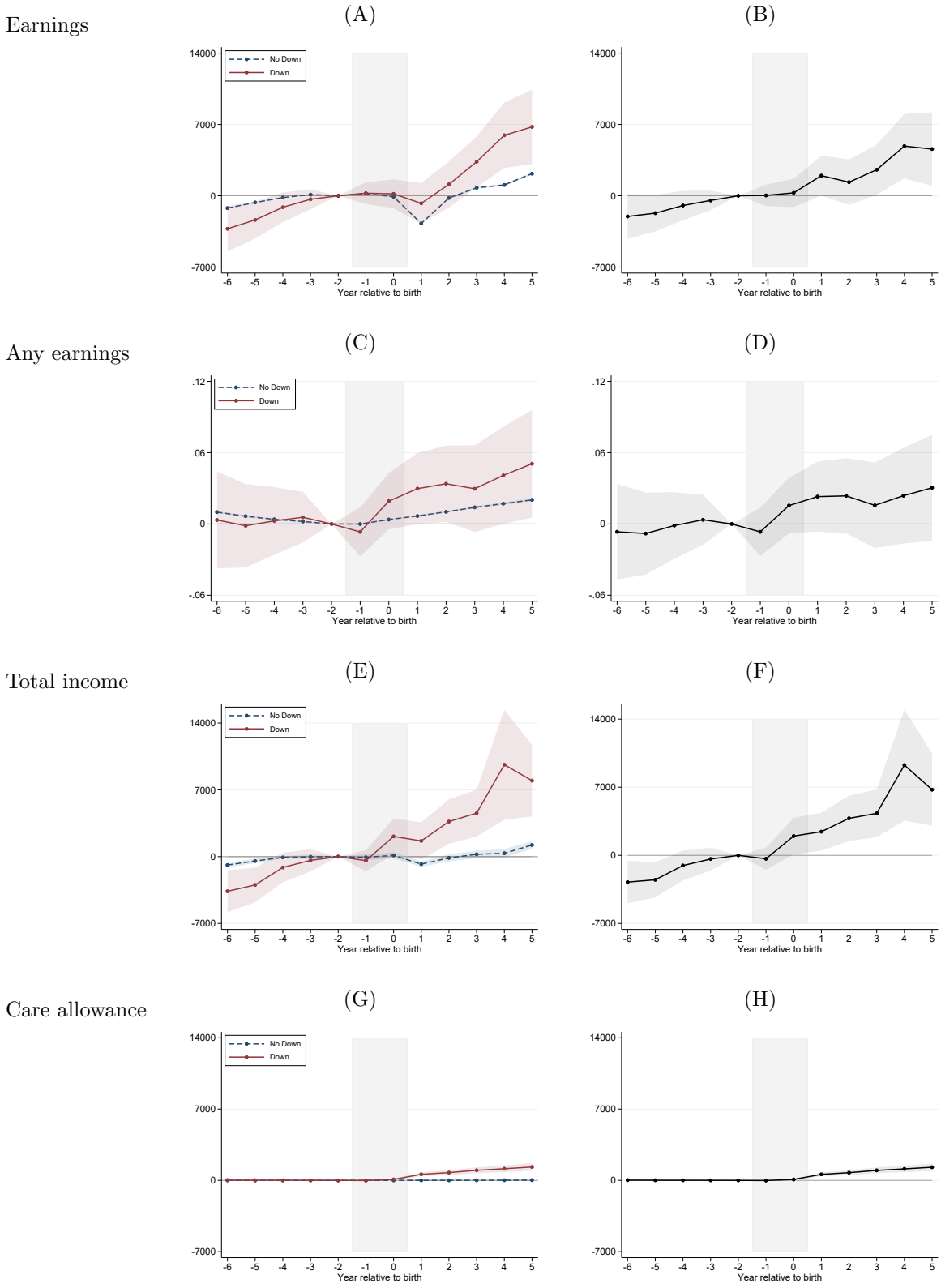
Note: See Figure 3. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 924$ Down and $N = 1,266,684$ No-Down births.

Appendix Figure A15: Paternal Economic Outcomes (Prevalent-Testing Sample)



Note: See Figure 3. The sample is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later, and consists of $N = 1,232$ Down and $N = 1,359,233$ No-Down births.

Appendix Figure A16: Paternal Economic Outcomes (Prevalent-Testing, Age $\leq$ 34)



Note: See Figure 3. The sample is restricted to the Prevalent-Testing, Age $\leq$ 34 sample, i.e. births in 2006 and later born to mothers ages 34 and younger, and consists of $N = 638$ Down and $N = 1,026,109$ No-Down births.

Appendix Table A1: Sample Restrictions

	CA (1)	Percentage (2)	No-CA (3)	Percentage (4)
Live births 1990-2018	3,946	100.0	3,034,485	100.0
Singleton	3,807	96.5	2,947,302	97.1
Matched to a father	3,691	93.5	2,915,650	96.1
Never has non-Down CA	2,817	71.4	2,914,191	96.0
No-CA: never has Down	2,817	71.4	2,910,184	95.9
Down: only one Down birth	2,811	71.2	2,910,184	95.9
Birth order ≤ 10	2,807	71.1	2,909,637	95.9
Minor panel restrictions	2,805	71.1	2,909,021	95.9
Analysis sample	2,805	71.1	2,909,021	95.9
First-born	894	22.7	1,249,532	41.2
Second-born	1,040	26.4	1,069,136	35.2
Birth order 3+	871	22.1	590,353	19.5

Notes: Table reports the number of births remaining after each step of the sequential sample restriction procedure. It reports this separately in column (1) and (3) for births with chromosomal abnormalities ("CA") and without chromosomal abnormalities ("No CA"), respectively; columns (2) and (4) report the percentage of each of the starting samples that remains after each step. We begin with the sample of live births in the Medical Birth Records born between 1990 and 2018, inclusive. "Matched to a father" refers to the births for whom we can identify the father in the data. "Never has non-Down CA" keeps only the births where the mother never has a birth with a chromosomal abnormality other than Down syndrome; this restricts column (1) to Down births only. "No-CA: never has Down" drops the siblings of Down births from the No CA sample. "Down: only one Down birth" removes mothers with more than one Down syndrome birth from the Down sample. "Birth order ≤ 10" keeps only the births with birth order at most 10. "Minor panel restrictions" drops births for which the mother is not observed in the raw income data in any year in [-6,5] relative to the birth.

Appendix Table A2: Average Birth Effects on All Components of Maternal Income, in 2018 USD (No-Testing Sample)

	Yr -2 mean (1)	Yr 5 No-Down effect (2)	Yr 5 incremental Down effect (3)
Total income	18,611	-5,864	7,671
		(43.93)	(575)
Earnings	14,133	-6,447	-2,055
		(17.17)	(590)
Care allowance	41.05	126	9,771
		(1.70)	(206)
Unemployment insurance	1,282	400	-310
		(4.93)	(172)
Parental leave	2,531	972	244
		(4.66)	(230)
Study income	738	28.10	-117
		(3.31)	(122)
Capital income	-477	-601	-19.93
		(40.89)	(173)
Other income	363	-344	159
		(4.04)	(154)

Notes: Table reports averages of γ_r^j over relative years 1-5 in equation (3) in column (2) for No-Down births, and averages of θ_r over relative years 1-5 in equation (4) in column (3). Standard errors clustered at the parent level are reported in parentheses below each estimate. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 928$ Down and $N = 1,275,465$ No-Down births.

Appendix Table A3: Average Birth Effects on Paternal Economic Outcomes, in 2018 USD (No-Testing Sample)

	Yr -2 mean (1)	Yr 5 No-Down effect (2)	Yr 5 incremental Down effect (3)
Earnings	25,102	-146	-62.35
		(30.84)	(964)
Any earnings	0.909	0.012	-0.010
		(0.000)	(0.013)
Total income	27,266	-935	1,328
		(69.59)	(922)
Care allowance	3.97	5.18	606
		(0.39)	(80.20)

Notes: Table reports averages of γ_r^j over relative years 1-5 in equation (3) in column (2) for No-Down births, and averages of θ_r over relative years 1-5 in equation (4) in column (3). Standard errors clustered at the parent level are reported in parentheses below each estimate. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 924$ Down and $N = 1,266,684$ No-Down births.

Appendix Table A4: Yr. 5 Incremental Down Effect: Robustness Checks with No-Testing Sample

	Living with father (1)	Subsequent births (2)	Earnings (3)	Total income (4)	N Down	N No-Down
Baseline	0.086	0.150	-2,055	7,671	928	1,275,465
	(0.028)	(0.034)	(590)	(575)		
Drop deaths within 5 years	0.095	0.100	-2,050	8,285	869	1,271,030
	(0.029)	(0.034)	(619)	(590)		
Balanced panel	0.095	0.131	-1,912	8,362	745	1,016,455
	(0.031)	(0.038)	(672)	(624)		
Diagnoses up to 3 months post-birth	0.077	0.136	-1,996	7,739	991	1,275,083
	(0.027)	(0.033)	(574)	(556)		

Notes: Table shows averages of θ_r in equation (4). Columns (1)-(2) report the coefficient estimate in relative year 5, and columns (3)-(4) report averages over relative years 1-5. The outcome in each column is (1) an indicator for whether the mother is living with the father of the child, (2) the cumulative count of the mother's subsequent births after the focal birth, (3) maternal earnings, and (4) maternal total income defined as the sum of earnings, unemployment insurance, parental leave, care allowance, study income, capital income, and all other taxable work-related income. Standard errors clustered at the parent level are reported in parentheses below each estimate. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger.

Appendix Table A5: Yr. 5 Incremental Down Effect: Robustness Checks with Prevalent-Testing Sample

	Living with father (1)	Subsequent births (2)	Earnings (3)	Total income (4)	N Down	N No-Down
Baseline	0.060	0.051	2,268	12,586	1,241	1,368,623
	(0.024)	(0.025)	(841)	(884)		
Drop deaths within 5 years	0.060	0.043	2,206	12,728	1,198	1,365,680
	(0.024)	(0.025)	(854)	(899)		
Balanced panel	0.033	0.048	2,926	13,286	873	883,328
	(0.030)	(0.032)	(1,038)	(1,102)		
Drop 2006 births	0.051	0.057	2,300	13,029	1,090	1,269,492
	(0.026)	(0.028)	(953)	(989)		
Diagnoses up to 3 months post-birth	0.037	0.052	2,057	12,531	1,401	1,367,788
	(0.023)	(0.024)	(784)	(822)		

Notes: Table shows averages of θ_r in equation (4). Columns (1)-(2) report the coefficient estimate in relative year 5, and columns (3)-(4) report averages over relative years 1-5. The outcome in each column is (1) an indicator for whether the mother is living with the father of the child, (2) the cumulative count of the mother's subsequent births after the focal birth, (3) maternal earnings, and (4) maternal total income defined as the sum of earnings, unemployment insurance, parental leave, care allowance, study income, capital income, and all other taxable work-related income. Standard errors clustered at the parent level are reported in parentheses below each estimate. The sample is restricted to the Prevalent Testing sample, i.e. births in 2006 and later.